



NEXTFLEX PROPOSER'S DAY:

PROJECT CALL 11.0:

INDUSTRIALIZATION & INTEGRATION

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ACKNOWLEDGMENT



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AGENDA



- Additional Resources
- NextFlex Background
- PC 11.0 Process, Schedule, and Themes
- PC 11.0 Topics
- Evaluation Criteria
- Q&A
- PC 11.0 Teaming Event



ADDITIONAL RESOURCES



PC 11.0 Events

- PC 11.0 Teaming Event – to follow

PC 11.0 Guidebook

- Definitive reference for PC 11.0

Still have questions?

- proposal@nextflex.us

PROJECT CALL 11.0: INDUSTRIALIZATION & INTEGRATION

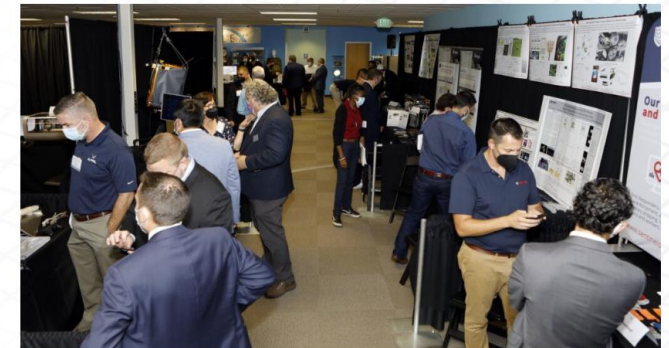
ABOUT

NextFlex **Project Calls** fulfill one of the Institute's primary goals: **fostering technology innovation and commercialization.**

Project Call (PC) 11.0: Industrialization & Integration is the second part of the eleventh project call issued by NextFlex. Like the previous project calls, it is intended to advance the state of the art in manufacturing for hybrid electronics and to promote the strength, competitiveness, and interconnectedness of the U.S. manufacturing industrial base for hybrid electronics. Each NextFlex project call builds from and implements changes relative to past project calls, and all proposers should carefully read all sections of this guidebook to understand changes in proposal development, required content, submission, evaluation, eligibility, and selection criteria.

Important considerations for PC 11.0: Industrialization & Integration:

- Proposal process will be 1-stage (straight to full proposal) – there is no pre-proposal round
- Discussion with NextFlex during proposal development is strongly encouraged to ensure that proposals align to the goals of the topics
- Projects are expected to be technically focused and of modest duration (maximum duration 15 months, by topic)
- Topic areas are broadly defined, allowing proposers to determine the specific subject of their proposal; proposals should explain the importance and relevance of the chosen



<https://www.nextflex.us/project-call/project-call-11-0/>



NEXTFLEX BACKGROUND

PROJECT CALL 11.0

Manufacturing USA connects people, ideas and technology to solve industry-relevant advanced manufacturing challenges. The 18 Manufacturing Innovation Institutes, 9 of which are funded by the Department of Defense, are enhancing industrial competitiveness and economic growth and strengthening our national security. The Institutes have three shared goals:

1. Advance the manufacturing & technology process to full scale production

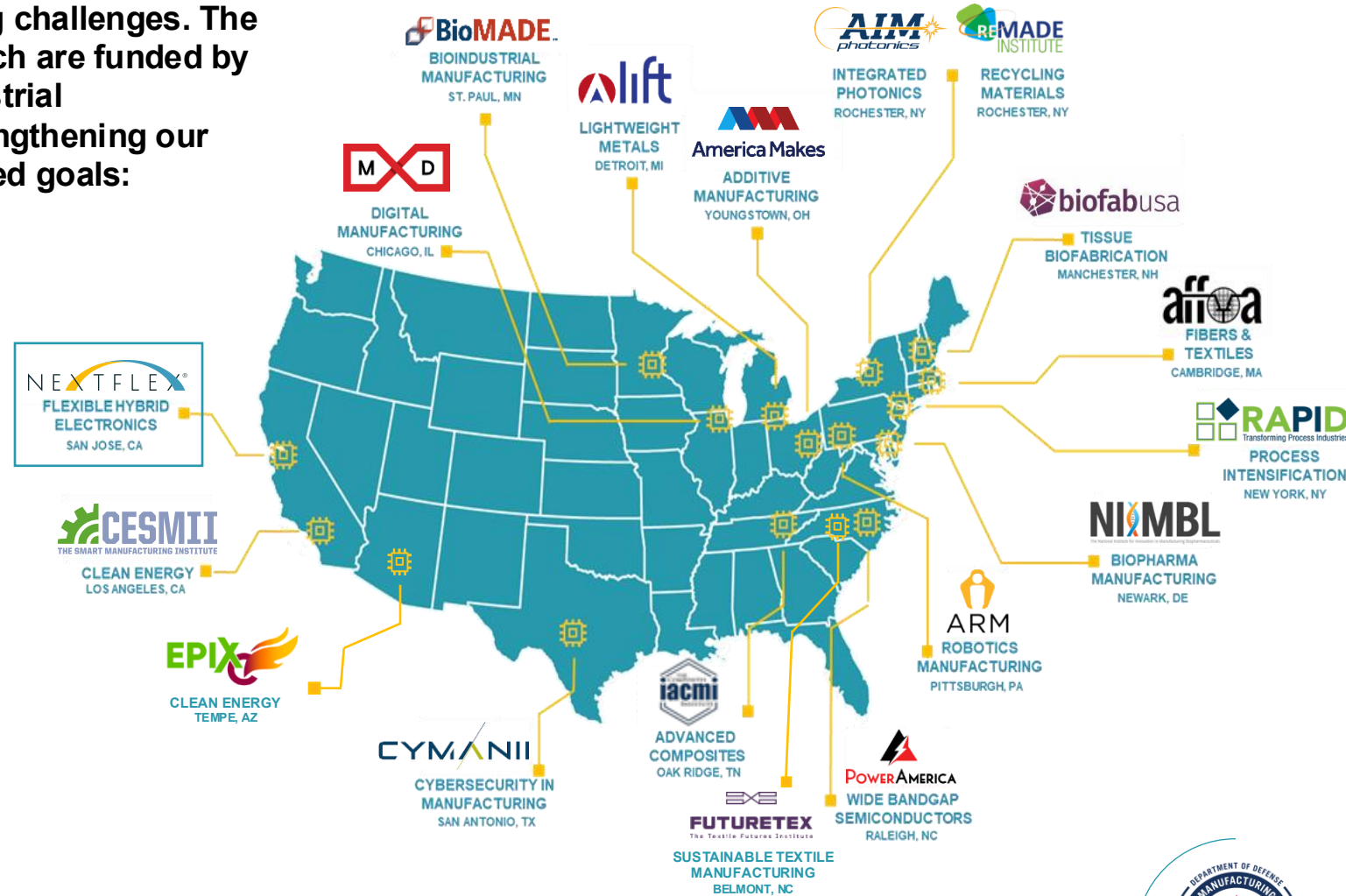
Partner with industry to investment in applied research and industrially-relevant manufacturing technologies

2. Create a robust commercial ecosystem around the technology

Establish regional manufacturing hubs and ecosystems for long-term, national impact

3. Secure human capital

Develop manufacturing-specific education and workforce development resources to ensure innovative technology is manufacturable



NextFlex: Hybrid Electronics Manufacturing Innovation Institute



Mission: Create a Strong U.S. Industrial Base for Hybrid Electronics

Public-Private Partnership Est.	August 28, 2015
Technology Hub Location	San Jose, California
Industry, Academic, Gov. Members	>200 across supply chain
State / Regional Hubs	New York, Massachusetts, Missouri, Alabama

Projects	>300 projects >\$450M total value
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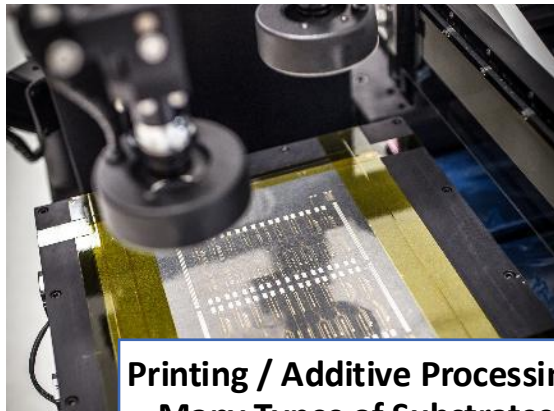
Key Outcomes	Manufacturing Tools, Process, Products & Prototypes to DoW & Industry, Integrated Knowledge
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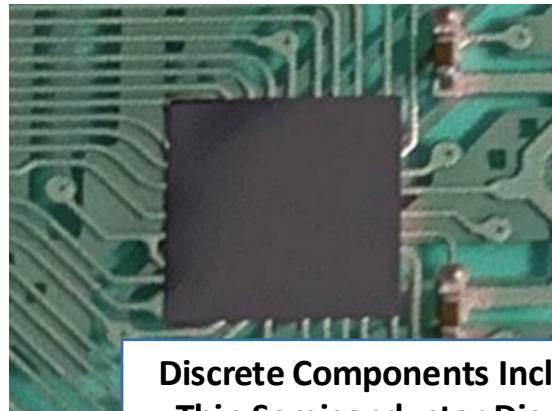
HYBRID ELECTRONICS MANUFACTURING



Hybrid Electronics (HE) combines additive electronics manufacturing with electronics assembly, enabling a many device types and spanning electronic packaging to system integration.



Printing / Additive Processing
Many Types of Substrates



Discrete Components Incl.
Thin Semiconductor Die



Edge Device /
Machine Learning



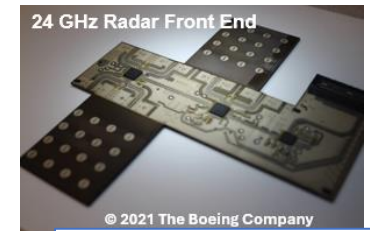
Medical & Wearable



3D Structural
Electronics



Aerospace &
Automotive



RF / Communications

Additive Electronics
Flexible Electronics
Advanced Packaging

...



Industrial Base: NextFlex Members and Partners

MATERIALS



EQUIPMENT



DESIGN/COMPONENT MFG



SEMICONDUCTOR



DESIGN/MANUFACTURING



INDUSTRIAL/AEROSPACE/DEFENSE



MEDICAL/WEARABLE DEVICES



RESEARCH



ACADEMIA



WORKFORCE



ASSOCIATE MEMBERS



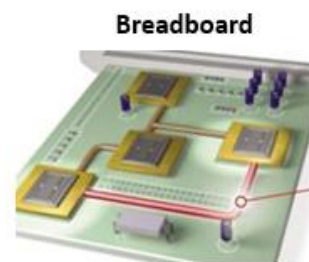
GOVERNMENT PARTNERS AND SUPPORTERS



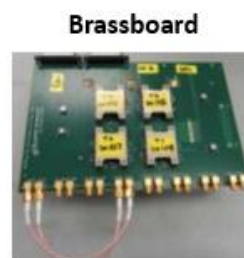
69 Government partner organizations; many have been involved since the beginning and have expanded their relationship with NextFlex over time.

MRL AND TRL RELATIONSHIPS

Pre-Material Solution Analysis			Materiel Solution Analysis	Technology Maturation and Risk Reduction		Engineering & Manufacturing Development		Production & Deployment	
MRL 1 Basic Mfg Implications Identified	MRL 2 Mfg Concepts Identified	MRL 3 Mfg Proof of Concept Developed	MRL 4 Manufacturing Processes In Lab Env't	MRL 5 Components <i>In Production Relevant Env't</i>	MRL 6 System or Subsystem <i>In Production Relevant Env't</i>	MRL 7 System or Subsystem <i>In Production Representative Environment</i>	MRL 8 <i>Pilot Line</i> Demonstrated Ready for LRIP	MRL 9 LRIP Demonstrated Ready for FRP	MRL 10 FRP Demo'd Lean Production Practices in Place
TRL 1 Basic Principles Observed	TRL 2 Concept Formulation	TRL 3 Proof of Concept	TRL 4 Breadboard in Lab	TRL 5 Breadboard in Representative Environment	TRL 6 Prototype in Representative Environment	TRL 7 Prototype in Operational Environment		TRL 8 System Qual	TRL 9 Mission Proven



- Breadboard**
- Focus Examples:**
- Technology and Industrial Base
 - Materials
 - Cost and Funding



- Brassboard**
- Focus Examples:**
- Design
 - Process Capability and Control
 - Quality Management



- Production**
- Focus Examples:**
- Manufacturing Workforce
 - Facilities
 - Manufacturing Management



Slide adapted from AFRL
Materials and
Manufacturing
Directorate



PROJECT CALL 11.0

PROCESS, SCHEDULE, AND THEMES

TECHNICAL WORKING GROUPS (TWGs)





Manufacturing Thrust Areas

-  **Device Integration & Packaging**
-  **Materials**
-  **Modeling & Design**
-  **Printed Components & Microfluidics**
-  **Standards, Test & Reliability**



Technology Platform Demonstrators

-  **Automotive**
-  **Asset Monitoring Systems**
-  **Flexible Power**
-  **Human Monitoring Systems**
-  **Integrated Antenna Arrays**
-  **Soft & Wearable Robotics**



VERSIONS OF THE ROADMAP



Member-Benefit Version
~20 pages each (>200 pages)



**Available on the Member Portal
TWG Pages**

Public Summary
1 page each (15 pages)

DEVICE INTEGRATION & PACKAGING

SCOPE The focus of the Device Integration and Packaging Technical Working Group (DIP-TWG) is to establish manufacturing methods for preparation, placing, interconnecting, and protecting circuit components onto flexible substrates for the fabrication of fully flexible and/or conformal electronic circuits. The DIP-TWG plans integration methods for sensing, communication and computational elements that can adapt to a multitude of geometric and environmental constraints.

STATE OF THE ART

Component / Element	SOTA Specs
Circuit Layers	8
Via Diameter	100-250 µm
Dielectric Thickness	≥25 µm
Bend Radius	>6x thickness
Sheet-to-Sheet Lines & Spaces	50-200 µm
Roll-to-Roll Lines & Spaces	250 µm
Printed conductors	3-20x bulk resistivity
Components	SMTs with solder attach
Printed Resistors	±20% tolerance
Flip-Chip Attach to Flex	100 µm pitch
Die Size	<5 mm ²
Die Thickness	<250 µm
Die I/Os	<100
Pad Area	>75µm sq
Pitch	>150 µm

Application-driven alignment for the Device Integration & Packaging TWG with key technology transition opportunities.

KEY OPPORTUNITIES

- Integrated, conformal electronic systems replacing discrete assemblies
- SWaP-C reduction through embedded interconnects and functionality
- Scalable manufacturing for hybrid additive electronics
- Electronics integrated directly into structures & surfaces
- Co-designed materials, devices, and packaging for improved performance
- On-demand, distributed manufacturing and repair

TECHNICAL ROADMAP TAXONOMIES AND GAP AREAS

Advanced Packaging

- Additive manufacturing integration (add. 3D/2D)
- High-density redistribution & interconnect networks
- Reliability modeling for additive packaging systems

Encapsulation

- Active thermal management integration
- Protective thermal barrier, moisture and structures
- Thermal reliability in flexible packaging systems

Device Assembly

- Seamless compatibility in hybrid interconnect systems
- Interconnect reliability, or printed interconnects
- Low-temperature assembly processes

Circuitization

- Printed passive component performance & integration
- Reliable printed and interconnect interconnect networks
- Scaling electronic performance for IoT systems

PROJECT CALLS

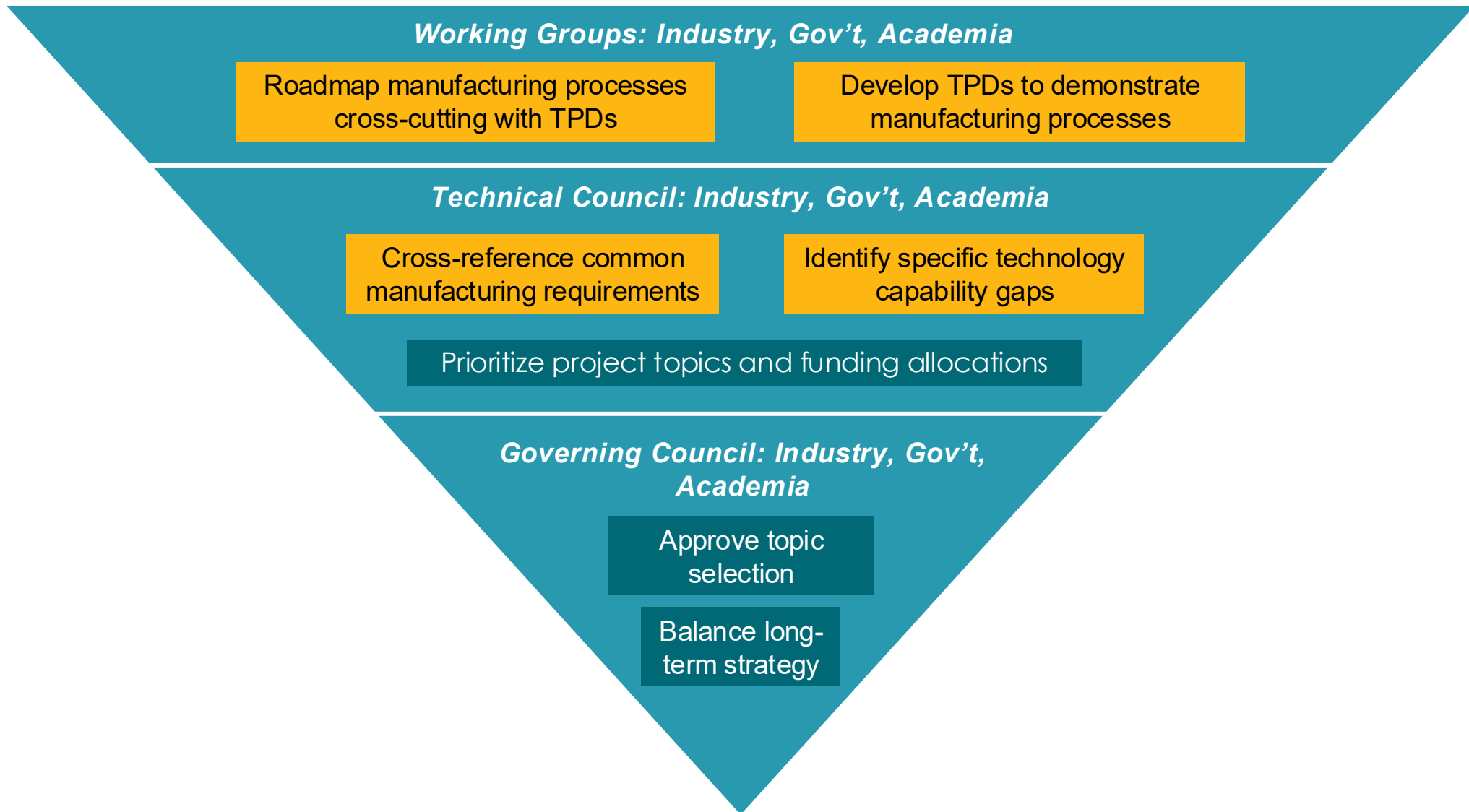
To date, NextFlex has funded 47 projects that align to the Device Integration & Packaging Working Group, including PCS 2 shown below.

PCS 2: CuHD: direct Copper Printing on integrated die led by Lockheed Martin

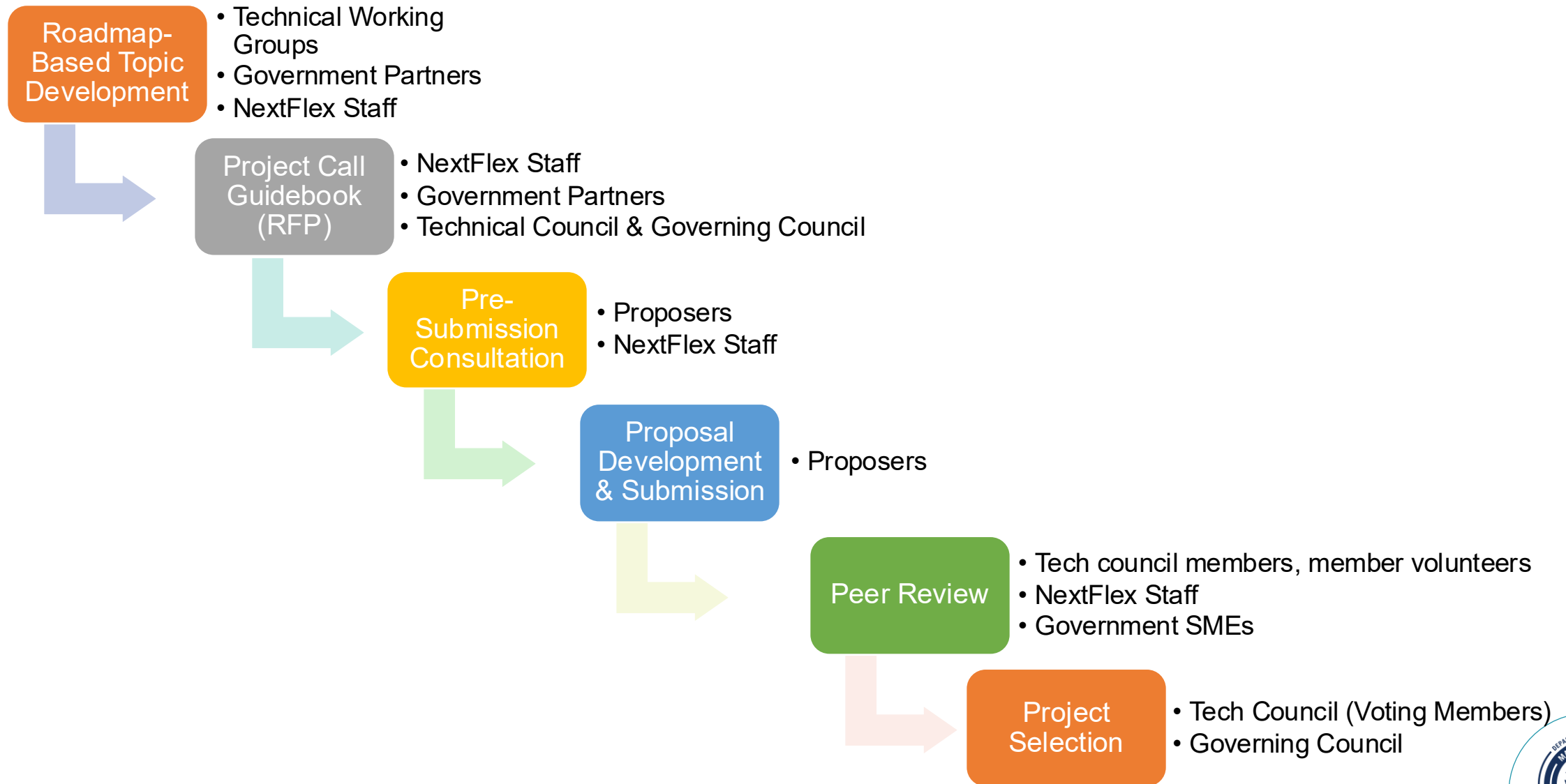
Available on [PC 11.0 website](#)



PROJECT CALL TOPIC DEVELOPMENT



PROJECT CALL 11.0 PROCESS



PROJECT CALL 11.0 KEY DATES



Event	Date
Project Call Announcement and Posting	10/8/2026
PC 11.0 Proposers Day and Teaming Event (Virtual)	10/15/2026
First Date for Optional Pre-submission Consultation	10/19/2026
Proposal Online Cover Sheet Due	12/02/2026
Proposal Submission Deadline	12/09/2026
Approximate Technical Council Review	Mid-Feb
Approximate Governing Council Review	Late-Feb



PC 11.0 TOPIC DEVELOPMENT

- Topics were derived directly from TWG roadmap gap analyses and cross-TWG priorities, targeting the most critical barriers to broader adoption of hybrid electronics.
- Key technical themes:
 - Integrated Electronics on Structures & Platforms
 - Electronics in Extreme Operational Environments
 - Manufacturing Maturation, Scale-Up & Process Control
 - Hybrid Integration & System Interfaces
 - Process Qualification & Transition Readiness
- Topics are structured similarly to the topics in previous project calls
 - Open (but more bound) subject areas to broaden the group of interested proposers and reduce perceived favoritism, while maintaining alignment with key priorities.
- Each topic combines a broad objective with defined areas where proposals are sought, guiding proposers toward solutions that address the highest-impact technical challenges. This may be especially important for non-members, who cannot access the NextFlex roadmaps.

PROJECT CALL 11.0: IMPORTANT CONSIDERATIONS



- NextFlex anticipates funding at least one project in each topic area; however, other outcomes are possible depending on the cost and quality of the projects proposed.
- Given the clear focus on projects that have a near-term commercial impact and transition potential, teams that are industry-led or have a strong industry partner as part of the commercialization plan will be favorably considered in the evaluation process.
- Proposals that include an engaged DoW stakeholder will be given strong preference. Examples of engagement include: a signed Memorandum of Understanding (MOU), a co-development partner from a service lab, requirements from a representative of a Portfolio Acquisition Executive (PAE) or Program Executive Office (PEO), a partner in the Organic Industrial Base planning to adopt the technology, etc.
- Proposals that fall within the topics area definitions that address DoW Critical Technology Areas and other priorities of the DoW will be given preference.
- Prior to final awards, recipients and development partners who are not already NextFlex members will be required to become members of the Institute and execute a development agreement.
- Should teams find that the topics listed herein are not of interest to their organizations, NextFlex always welcomes suggestions for future project call topics; recommendations should be brought to the attention of the NextFlex TWGs.



PROJECT CALL 11.0: ITEMS TO CONSIDER



- Total NextFlex Funds: \$3.0M
- Estimated total project value (with cost share): >\$6M
- NextFlex Funding: ≤ \$500k – \$1,000k per project by topic
- The maximum duration of proposed projects is 18 months for this part of PC 11.0.
- Proposals should build on and take advantage of developments from prior project calls, where appropriate, as well as the best available technology.



PROJECT FUNDING & NEXTFLEX MEMBERSHIP



- Minimum of 50% of each project's total cost must be cost-share provided by recipients
- 50% minimum cost-share requirement is based on entire team – not individual contributors
- Cost share can include labor, materials, use of equipment, travel
- Any recipient of NextFlex funding must be a Tier 1-3 member
 - This applies to all sub-recipients / project partners performing development work
 - Companies supplying standard COTS components or services (e.g. build-to-print) to team members are not required to be members of NextFlex.
- Federal Government partners cannot receive NextFlex funding, although their self-funded participation is encouraged.



PROJECT OBJECTIVES AND DELIVERABLES

- Reliability and standards cut across all topics; although not called out in every topic description, all PC 11.0 proposals are encouraged to address these needs within their project plans.
- Projects focused on process development must document processes with enough detail that they are reliably replicable.
- These projects shall include, but are not limited to, the following deliverables:
 - Data (raw and processed) on materials, processes, performance, and reliability for sharing at quarterly reporting intervals following the acquisition of the data.
 - A flow chart of the process steps and design information (such as drawings, CAD files, etc.) for device fabrication or process repetition.
 - Details of the method of test and measurement performed during development to establish TRL and MRL advancements.
 - Identification of the specific task and outcome that results in TRL and/or MRL advancements.
 - Cost model framework and associated assumptions for the proposed manufacturing technique.

PROJECT OBJECTIVES AND DELIVERABLES (CONT.)

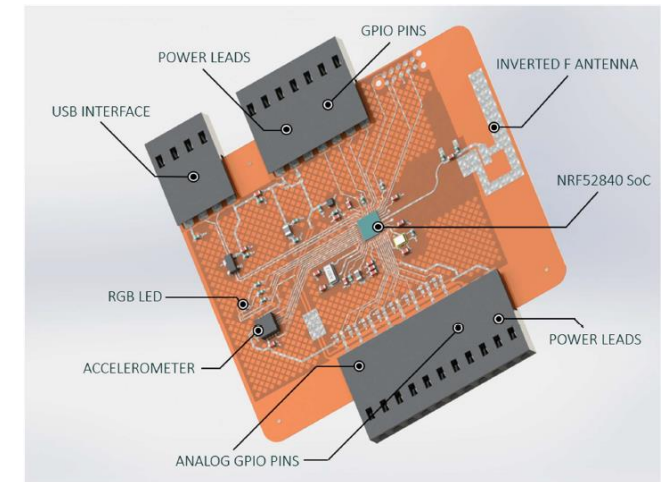


- Relevant process information including:
 - a) Resolution, thickness, and material properties (e.g., sheet resistance) that can be obtained with the developed recipe
 - b) Tolerance and yield of components, along with a comparison to device manufacturing processes that are currently used in the industry
 - c) Consistency of print quality (line edge roughness, loss or gain in dimension, uniformity in thickness and layer roughness) of the layer(s) in the device
 - d) Consistency in device properties (resistance, capacitance, inductance, etc.) along with a comparison to similar devices that are commercially available
 - e) Optimized print equipment parameters (print speed, ink volumes, ink viscosity, curing conditions, print environment, etc.)
 - f) Mechanical constraints (e.g., tensile strength, bending) of the printed devices
- NextFlex requests physical “hardware” deliverables from all projects, sufficient to demonstrate and showcase the development work completed in the project. These may take many forms, such as sample parts produced in a process development process, test coupons for new materials, functional systems or subsystems from platform demonstrator projects, etc.



PLATFORM DEMONSTRATOR DELIVERABLES

- Platform demonstrators should showcase the capabilities of novel technology solutions and clearly illustrate the value proposition of utilizing hybrid electronics manufacturing approaches.
- NextFlex cannot fund product development, however, proposers are encouraged to develop 'product-like' functional demonstrators that achieve this goal.
- This includes necessary packaging, software/firmware, support, etc. and are polished and comprehensive exhibits of the technology.
- Proposals that build on previous NextFlex-funded efforts to demonstrate a transitionable capability are strongly encouraged.
- The design information for the NextFlex-developed 'A21' flexible microcontroller device can be made available to NextFlex members to serve as the basis for demonstrator development. For more information, contact proposal@nextflex.us.
- Proposers are strongly encouraged to also generate images and videos of demonstrators functioning to showcase their capabilities and provide them to the Institute and government partners.



PROJECT CALL 11.0: I&I TOPICS

PC11.0: INDUSTRIALIZATION & INTEGRATION TOPICS



Topic #	Topic Description	Max Duration (months)	Max Funding *	Technical Working Group Alignment										
				Modeling & Design	Materials	Printed Components & Microfluidics	Device Integration & Packaging	Standard, Test & Reliability	Asset Monitoring Systems	Automotive	Flexible Power	Human Monitoring Systems	Integrated Array Antennas	Soft & Wearable Robotics
11.4	Manufacturing Maturation and System Integration for Hybrid Electronics	18	\$ 500k		O	X	X	O						
11.5	Qualification and Certification Frameworks for Hybrid Electronics	18	\$ 500k	O		O	O	X	O	O		O	O	
11.6	Integrated Hybrid Electronics for Structures and Platforms	18	\$ 1,000k						X	X	O		X	
				X	Direct TWG Alignment									
				O	Indirect TWG Alignment									

Total budget: \$3M
Expect to fund 1 project in each topic; totaling \$2M
Remaining \$1M provides flexibility to fund additional project(s) in any topic



NEW PROJECT LEADS: OPPORTUNITIES ACROSS ALL TOPICS



Who is eligible?

- Organizations that have not previously served as the lead organization on a NextFlex Project Call project.
- Prior participation as a project partner or subcontractor does not preclude eligibility.

How to propose

- Submit under any PC11:I&I topic: 11.4, 11.5, or 11.6.
- Meet the topic's full technical scope and requirements.
- Allocate at least 60% of the requested Institute funding to eligible new-lead organizations.

Funding and selection

- Up to \$500,000 of the available Institute funding is intended to support a proposal led by an eligible new project lead.
- All proposals undergo the same technical evaluation.
- New-lead eligibility may inform Technical Council and Governing Council portfolio selection; it is not part of reviewer scoring.



BROADLY DEFINED TOPICS WITH EXAMPLE AREAS OF INTEREST



- Topics aim to advance hybrid electronics technology and fill gaps identified by the TWGs in the Roadmaps. The outcomes of the projects that are selected are expected to have broad impact on both commercial and defense applications and to advance U.S. hybrid electronics manufacturing capability.
- Each topic has a maximum funding and duration; proposals that seek lower levels of funding and shorter duration are welcome.
- Topics are structured with a description that include all requirements followed by sub-topics that align to prioritized roadmap gaps.
- Proposals should clearly align to at least one sub-topic and address one or more of the associated technical focus areas.
 - While proposers are not required to address every listed area, competitive proposals will demonstrate meaningful alignment with these defined needs and articulate how the proposed work advances the stated objectives of the topic.
 - Alternative approaches that fall within the overall scope of the topic and address relevant manufacturing gaps may also be considered, provided they are well-justified and aligned with the intent of the topic.



TOPIC 11.4: MANUFACTURING MATURATION AND SYSTEM INTEGRATION FOR HYBRID ELECTRONICS



\$500,000 maximum Institute funds / Up to an 18-month duration

This topic seeks to advance relatively mature Hybrid Electronics manufacturing technologies toward broader industrial adoption by addressing remaining barriers to repeatable fabrication, component integration, and connection to conventional electronics and systems.

Proposed efforts should begin with a manufacturing process or integration approach that has demonstrated technical feasibility and focus on the remaining manufacturing challenges preventing implementation in production-relevant environments. Projects should emphasize maturation and implementation of existing approaches rather than early-stage development of new materials or manufacturing processes.

Projects should define the starting manufacturing capability and the specific barriers preventing broader adoption, with quantitative metrics established for the proposed advancement. Where scale-up is proposed, efforts should demonstrate meaningful production-relevant scale and quantify improvements in throughput, yield, repeatability, variability, or cost.

Representative hardware should be produced across multiple builds or lots where appropriate. Manufacturing documentation and data should be sufficient to establish repeatability and support future implementation, including relevant process specifications, process windows, design rules, inspection and acceptance criteria, yield and variability data, process-control strategies, and cost or throughput information. **Proposals are sought in the following areas:**

- a. Manufacturing Process Maturation, Scale-Up, and Control
- b. Solderable Printed Conductors and Hybrid Interconnects
- c. Connectorization and Printed-to-Conventional Electronics Integration
- d. Multilayer Additive and Hybrid Electronics Manufacturing



TOPIC 11.5: QUALIFICATION AND CERTIFICATION FRAMEWORKS FOR HYBRID ELECTRONICS



\$500,000 maximum Institute funds / Up to an 18-month duration

This topic seeks pre-competitive development and demonstration of manufacturing process qualification and certification frameworks, test methodologies, and supporting data for important classes of Hybrid Electronics technologies and manufacturing approaches.

Projects should leverage existing industry and defense standards wherever practical, identify gaps where existing requirements or test methods are insufficient, and establish broadly applicable approaches for addressing those gaps. Where standards gaps are identified, proposers should engage relevant standards-setting organizations, such as the Global Electronics Association (GEA) for IPC standards, SEMI, IEEE, or other applicable organizations, with the objective of ensuring project results can inform the development, revision, or advancement of relevant industry standards.

The focus of this topic is qualification of manufacturing processes and process capabilities, rather than qualification or certification of specific products. Projects funded under this topic shall not support qualification, certification, or product development of a proprietary commercial product or technology. Commercial technologies may be incorporated into project activities, but the focus should remain on the manufacturing process, technology class, interface, or qualification methodology rather than qualification of a specific supplier product.

Proposals are sought in the following areas:

- a. Application-Class Qualification Frameworks
- b. Standardized Test Methods and Reliability Validation
- c. Qualification Data Structures, Evidence Packages, and Design Guidance



TOPIC 11.6: INTEGRATED HYBRID ELECTRONICS FOR STRUCTURES AND PLATFORMS



\$1,000,000 maximum Institute funds / Up to an 18-month duration

Note: Platform demonstrators should showcase the capabilities of novel technology solutions and clearly illustrate the value proposition of utilizing hybrid electronics manufacturing approaches. NextFlex cannot fund product development, however, proposers are encouraged to develop 'product-like' functional demonstrators that achieve this goal.

Proposals that build on previous NextFlex-funded efforts to demonstrate a transitionable capability are strongly encouraged. The design information for the NextFlex-developed 'A21' flexible microcontroller device can be made available to NextFlex members to serve as the basis for demonstrator development. For additional information regarding the specifications and capabilities of the A21, please contact proposal@nextflex.us.

Proposals that include an engaged DoW stakeholder will be given strong preference. Examples of engagement include: a signed Memorandum of Understanding (MOU), a co-development partner from a service lab, requirements from a representative of a Portfolio Acquisition Executive (PAE) or Program Executive Office (PEO), etc.



TOPIC 11.6: INTEGRATED HYBRID ELECTRONICS FOR STRUCTURES AND PLATFORMS



This topic seeks application-driven demonstrations of Hybrid Electronics integrated directly into representative structures or platforms to address defined transition needs. Proposed efforts should integrate multiple elements—such as sensors, printed conductors and interconnects, signal conditioning or edge electronics, communications, RF functionality, and power—into a representative structure or surface and demonstrate operation under application-relevant conditions.

Platform demonstrators should showcase the capabilities of novel technology solutions and clearly illustrate the value proposition of utilizing Hybrid Electronics manufacturing approaches. NextFlex cannot fund product development; however, proposers are encouraged to develop “product-like” functional demonstrators that achieve this goal. Demonstrators should incorporate the packaging, software/firmware, interfaces, supporting electronics, and other elements necessary to provide a polished and comprehensive demonstration of the technology.

Demonstrations should address practical integration challenges such as electrical egress, connectorization, component attachment, encapsulation, structural compatibility, environmental protection, and integration with conventional electronics.

Proposals should identify a specific transition application and engaged end user or transition stakeholder, define limitations of the conventional approach, and establish quantitative performance and manufacturing objectives. Demonstrations should include representative physical hardware and sufficient environmental, mechanical, and functional testing to establish system-level value. Where appropriate, proposals should quantify improvements in size, weight, power, cost, wiring and connector count, installation complexity, maintainability, or other application-relevant measures.

Proposals are sought in the following demonstration areas:

- a. Distributed and Structurally Integrated Sensing
- b. Integrated Electronics on Vehicle and Aerospace Structures
- c. Conformal Multifunction RF Systems
- d. Persistent Sensing in Harsh or Difficult-to-Instrument Environments



EVALUATION CRITERIA

PROJECT CALL 11.0

PROPOSAL EVALUATION PROCESS



- Proposals are distributed to a slate of reviewers which include:
 - NextFlex members
 - Government subject-matter experts
 - NextFlex staff
 - NextFlex may occasionally engage other persons as part of the proposal review process (e.g., third-party SMEs)
- Reviewers evaluate the proposals, score each proposal in several categories, and provide comments.
- NextFlex compiles and analyzes the reviews and summarizes comments for the NextFlex Technical Council.
- Technical Council votes a set of recommendations to the NextFlex Governing Council.
- Governing Council votes to select projects for award negotiation.



PROPOSAL EVALUATION CRITERIA



PC11.0 Full Proposal Project Review Criteria / Score Card			
Criteria for all Project Call topics			Score Guide: Low=1, High=5; refer to scoring rubric worksheet
Reviewer Name:	ADD YOUR NAME HERE		
Reviewer Organization:	ADD YOUR ORGANIZATION HERE		
Proposal Section	Proposal Section	Criteria	Explanation of Criteria
Technical Merit & Transition Potential	1.0	Background and Need	(1) Problem statement, innovative solution, and potential impact on technical gap and/or DoD priorities Evaluate the problem definition in line with the background information and the gap analysis provided. Is the proposal aligned with TWG roadmaps, DoD Critical Technology Areas and/or DoD priorities?
	2.0	Technical Objectives	(2) Technical scope and approach Is the objective, scope and approach aligned with the problem definition? Are performance and reliability metrics and standards appropriately addressed? For demonstrator projects, what are the value to the ecosystem and the advantage of an FHE solution for this problem?
			(3) Logical technical plan; key deliverables and specifications Do the specifications and deliverables meet the proposed objectives and final deliverables? What are the key tangible deliverables & how do we assess success?
	3.0	Work Plan	(4) Project organization Is the project organized well with milestones and tasks; Are the task descriptions clearly articulated: Is the schedule aligned well with critical interdependencies identified?
			(5) Probability of success Based on all of the above, including the cost and the team capability, assess the feasibility to achieve the stated goals within the planned timeline.
	4.0	Commercialization Strategy	(6) Business case/value proposition What is the targeted application or market? How is the technology/product a differentiator or a game changer? Is the appropriateness of a hybrid electronics solution explained?
			(7) Manufacturing approach Is the technology/approach matured and ready for manufacturing? Is it the right approach? Does it help advance the MRL/TRL goals? Does the team have the right partners? Are they US-based? How mature is the process and/or manufacturing infrastructure? How does it impact US manufacturing?
			(8) Technology transition potential Is there a clear path for technology transition / commercialization? Does it address a significant need? Are the appropriate stakeholders engaged? Is there a plan to demonstrate that the technology will be sufficiently derisked?
			(9) MRL/TRL assessment Are the starting MRL/TRL accurate? Are the end MRL/TRL assessed correctly, and is it realistic considering the overall quality of the project and maturity of technology and approach?
Non-Technical Factors	5.0	Budget Justification and Cost Share	(10) Tool accessibility (for proposals developing tool hardware and software proposals only) Will the equipment/tool/software developed as part of the proposal be available to the ecosystem, and where they will be located?
			(11) Cost and cost realism Evaluate if the cost assessment is pragmatic based on the overall assessment of the project relative to its objective, team, advancement, timeline etc.
	6.0	Capability to Meet Technical and Business Goals	(12) Value and quality of cost share Assess based on the cost share value, cost share source and the purpose of the cost share.
			(13) Experience of personnel, quality of relevant facilities, and building supply chains Assess the strength of the PI team as well as the partner/subcontract organizations to achieve the proposal's goals. Does this project build or strengthen organizational relationships / supply chains?
	7.0	Education & Workforce Development	(14) Quality of EWD section What aspects of EWD are proposed? Is intern, graduate / undergraduate student, incumbent worker training, etc. included? Are courses developed and / or implemented? Are there industry and / or student outreach opportunities?

Technical Merit & Transition Potential Criteria

Non-technical Criteria



PROPOSAL EVALUATION AND SELECTION



- Evaluation criterion specifically focused on technology transition potential was retained for PC 11.0.
- Technical Score and a Non-Technical Score are determined by averaging the scores in from each category. Scores from all reviewers produce average scores and a Technical Ranking.
- Project selection will rely heavily on the Technical Score and Ranking; Non-Technical Score and reviewer feedback are particularly useful to distinguish proposals that are rated closely to each other, as well as to identify potential outliers (high or low).
- Scores and comments from reviewers will be compiled, ranked, and prioritized for consideration by the Technical Council in voting.
- The Governing Council will consider input from reviewers, Technical Council recommendations, and factors such as alignment with the NextFlex dual mission to promote development and U.S. manufacturing of hybrid electronics and support DoW technology transitions, and balance of the project portfolio in selecting proposals.



CALL FOR PC 11.0: I&I REVIEWERS

- Vitally important to the process that there be strong member involvement in reviewing
- Benefit of NextFlex membership because it allows your organization to influence what projects go forward
 - Members cannot serve as a reviewer for a topic in which their organization is proposing
- Please help recruit others from your organization to serve as reviewers
 - Each industry, academic, and non-profit member can provide one reviewer per topic
 - Government organizations may have multiple reviewers in a single topic (within reason)
- All reviewers should be familiar with NextFlex and hybrid electronics or the particular topic

**Volunteer to
Review Today!**

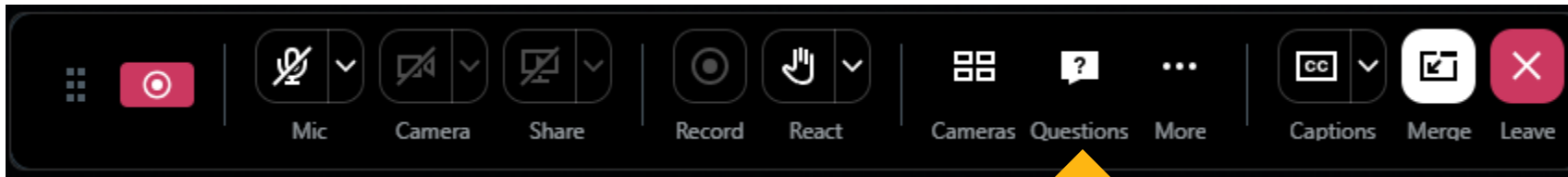
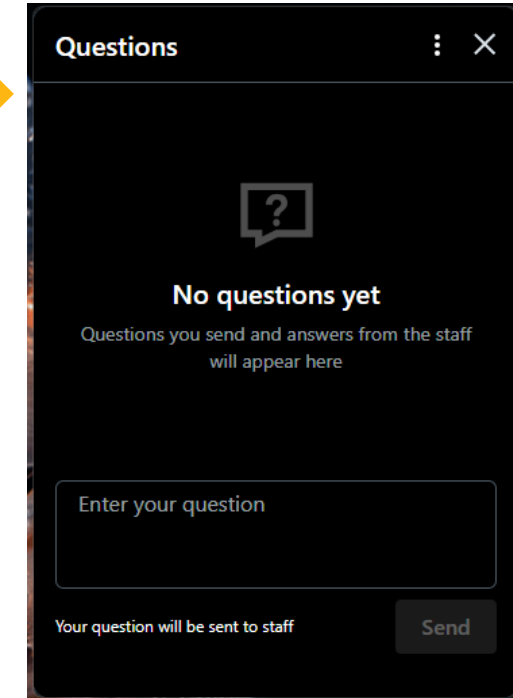
[https://nextflex.formstack.com
/forms/pc11_ii_reviewers](https://nextflex.formstack.com/forms/pc11_ii_reviewers)



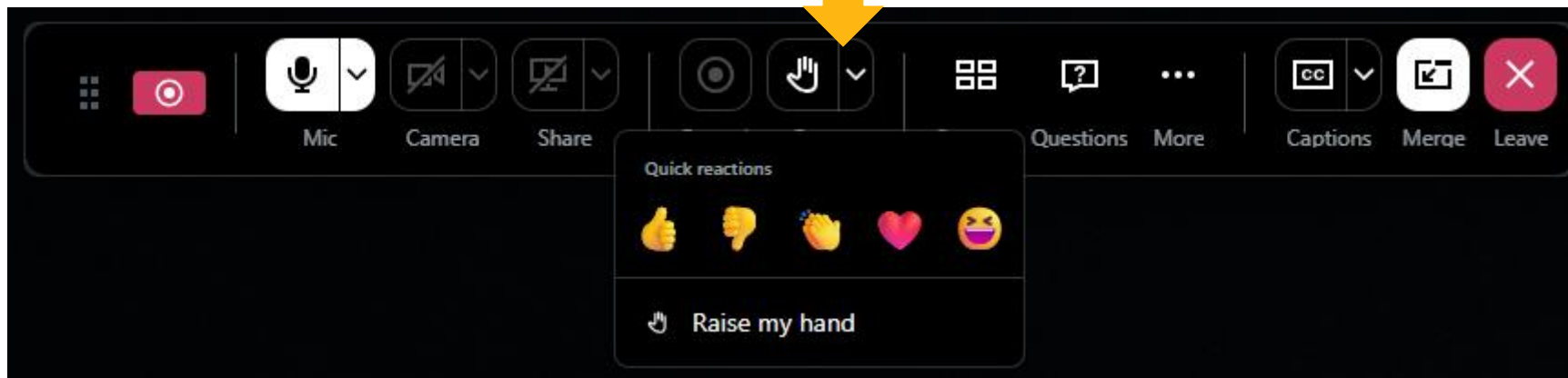
Q&A

QUESTIONS?

- **Method 1:** Click “Questions” on the control bar and enter your question in the Questions pane that pops up.



- **Method 2:** Raise your hand by clicking the “React” button on the control bar and then clicking “Raise my hand.”



- **Method 3:** Unable to access GoToWebinar? Email your questions to marcom@nextflex.us

proposal@nextflex.us

**Volunteer to
Review Today!**

[https://nextflex.formstack.com
/forms/pc11_ii_reviewers](https://nextflex.formstack.com/forms/pc11_ii_reviewers)





PROJECT CALL 11.0 TEAMING EVENT

TEAMING EVENT STRUCTURE



- We will progress through each of the topics sequentially
- Each proposer will be allowed a single slide and two minutes to pitch their proposal idea, capabilities, and / or type of partnership sought
- Please reach out to the presenters directly after the event for questions or to discuss collaboration opportunities



PARTNERING EVENT SLIDES RECEIVED



PC 11.4

- Ella Meng – KnowYi Technologies
- Brad Hull – Tapecon

PC 11.5

- Nick Ginga – UAH

PC 11.6

- Ethan Secor – Iowa State University
- Sabrina Curtis – Khanjur
- David Fries – Guided Particle Systems

Additional Interest & New Additions

If you have a slide you would like to share, please send to marcom@nextflex.us



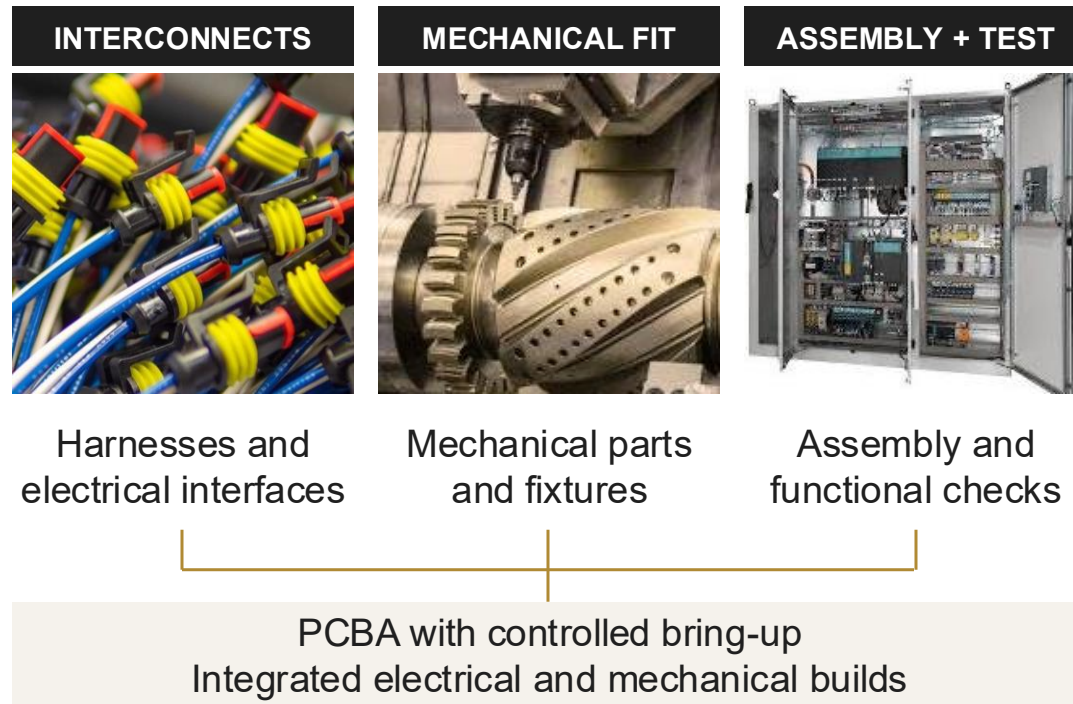


PC 11.4: MANUFACTURING MATURATION AND SYSTEM INTEGRATION FOR HYBRID ELECTRONICS

Manufacturing readiness for hybrid electronics

PC11.4 Manufacturing Maturation and System Integration

Relevant integration experience



Proposed manufacturing work package

- 01 Design-input gap matrix**
Interfaces, tolerances and missing inputs
- 02 Assembly and inspection plan**
Sequence, fixtures and measurable checks
- 03 First-article evidence**
Build and test records tied to requirements
- 04 Repeatability and transfer criteria**
Acceptance limits and change controls

PC11.5 qualification handoff

Traceable build evidence and agreed acceptance criteria

TEAMING WITH U.S. project lead / hybrid or printed-electronics specialist / qualification lab + pilot

Manufacturing & Commercialization Partner for Hybrid Electronics

Helping teams move promising FHE technologies toward manufacturable, scalable products

HOW TAPECON CAN SUPPORT YOUR TEAM

- 1 FUNCTIONAL PRINTING** Conductive, dielectric, graphic and functional layers
- 2 ELECTRONICS INTEGRATION** Component placement, bonding and hybrid assembly on paper & film
- 3 PRECISION CONVERTING** Lamination, multilayer integration and precision finishing
- 4 PROCESS SUPPORT** Materials, process development and design-for-manufacturing support
- 5 VALIDATION & SCALE-UP** Quality-controlled transition from development toward production



PARTNERING INTEREST

11.4 Manufacturing maturation & systems integration

11.6 Integrated hybrid electronics for structures & platforms

Focus: Projects addressing real-world needs with a credible path to scaled commercialization.

107 YEARS

U.S. Manufacturing

~5 DECADES

Printed & flexible electronics

ROBUST QMS

ISO 13485 • cGMP • ITAR

NEXTFLEX

Experienced project collaborator

CONNECT - BRAD HULL

Dir. Strategy & New Product Innovation
bhull@Tapecon.com





PC 11.5: QUALIFICATION AND CERTIFICATION FRAMEWORKS FOR HYBRID ELECTRONICS

Testing and Modeling of Flexible/Stretchable Devices

- **11.4 (Manufacturing & Integration):** Testing, modeling, and characterization of process variability, interconnect reliability, printed vias, and flex-to-rigid/connector transitions.
- **11.5 (Qualification & Standards):** Mechanical, environmental, and thermal fatigue testing to support standardized test methods, qualification frameworks, and DfR/DfM rules.
- **11.6 (Integrated Structures):** In-situ reliability testing, structural integration modeling, and failure analysis for embedded sensors and conformal RF/electronics in harsh environments.

Capabilities and Background:

- Mechanical Characterization:
 - Radial Stretch Tester (RST) - Monotonic and Fatigue
 - Biaxial and Uniaxial
- Wedge Tester - Adhesion
 - Load Frame - Monotonic and Fatigue
 - Simultaneous Temperature / Humidity testing
 - 3D Digital Image Correlation (DIC)
- Flexible and Stretchable Electronics
 - Printed electronics, Liquid conductors
- Finite element simulations (FEA)

Seeking Partners

- Industry, materials, manufacturing partners
- Stretchable electronics

Contact:

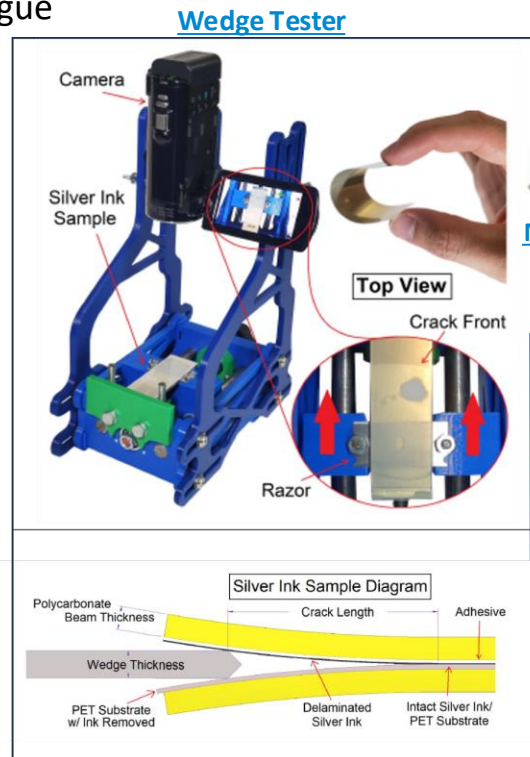
- Dr. Nick Ginga - University of Alabama in Huntsville
- nick.ginga@uah.edu ([Lab Group Website](#))



Environmental Chamber

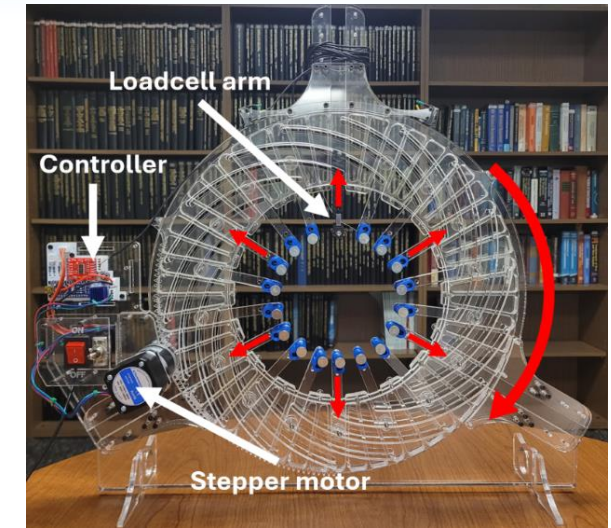
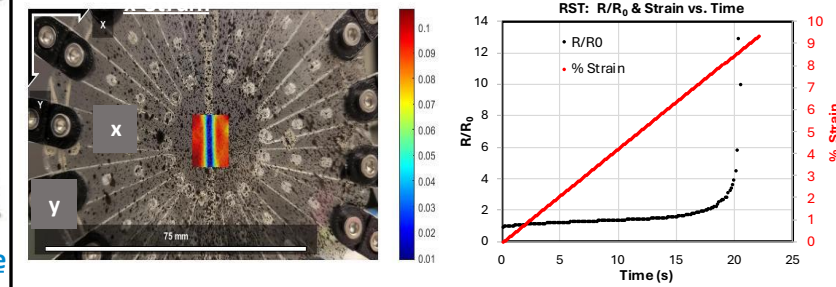
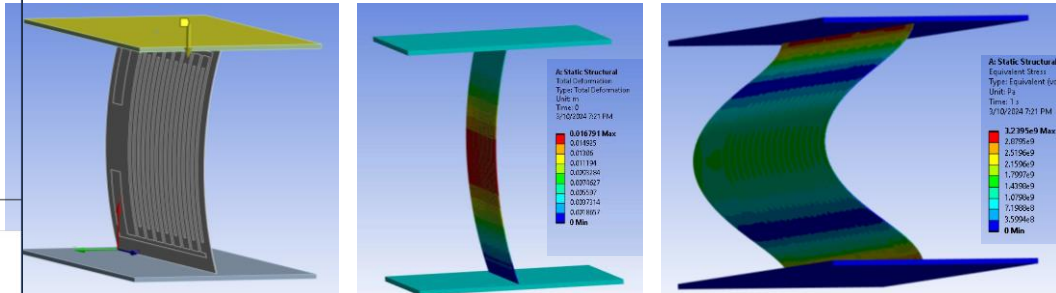


Tensile Monotonic/Fatigue Load Frame



Wedge Tester

Radial Stretch Tester (RST)



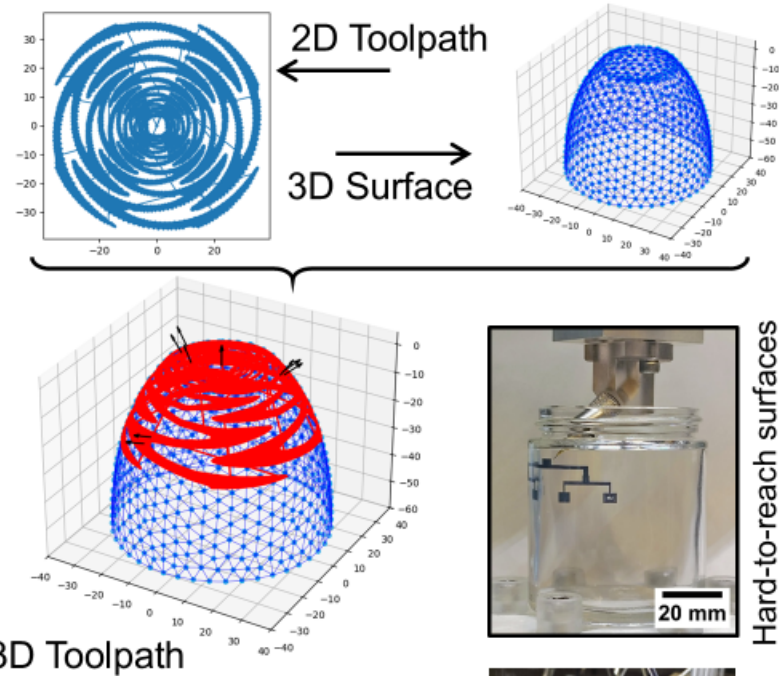
FEA of Additively Manufactured Flexible Capacitor



PC 11.6: INTEGRATED HYBRID ELECTRONICS FOR STRUCTURES AND PLATFORMS

Design-to-manufacturing workflow for digitally-printed conformal circuits

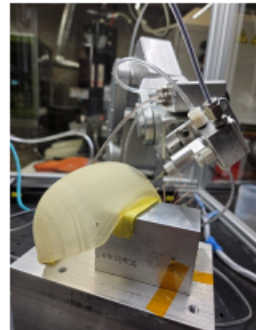
Conformal motion planning and aerosol jet printing



- Toolpath design for curved 3D surfaces
- Scan-to-print capability
- Kinematics and trajectory planning for custom motion platforms

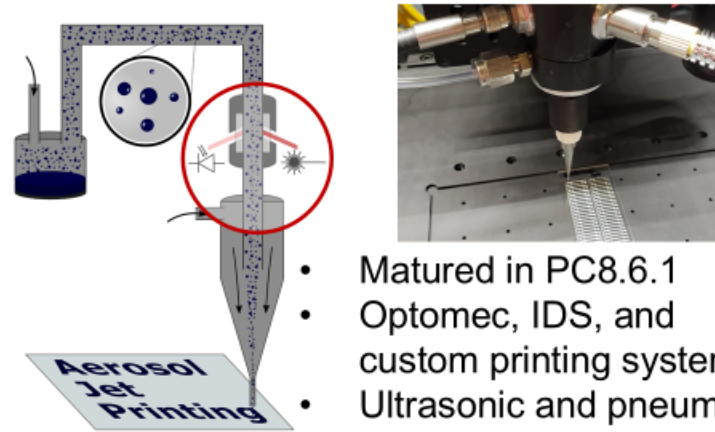


Hard-to-reach surfaces

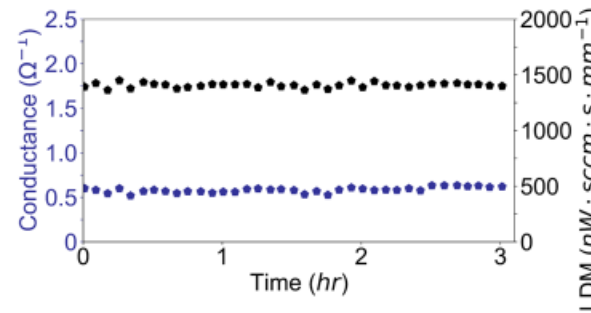


Immobile surfaces

Aerosol jet process monitoring and control (also PC 11.4)



- Matured in PC8.6.1
- Optomec, IDS, and custom printing systems
- Ultrasonic and pneumatic atomization



Improved print stability using a more complex control loop architecture
Broad value for AJP material and process development

Primary interests:

- Integrating electronics onto doubly curved composites
- Aerosol jet printing control and reliability
- Multilayer conformal circuits with discrete components
- Multimodal sensing for manufacturing maturation

What we can't do well (teaming opportunities):

- Circuit and antenna design, modeling, and testing
- Advanced mechanical testing
- Conformal printing beyond AJP and automated component placement
- Application-specific design

Ethan Secor, Iowa State University (esecor@iastate.edu)

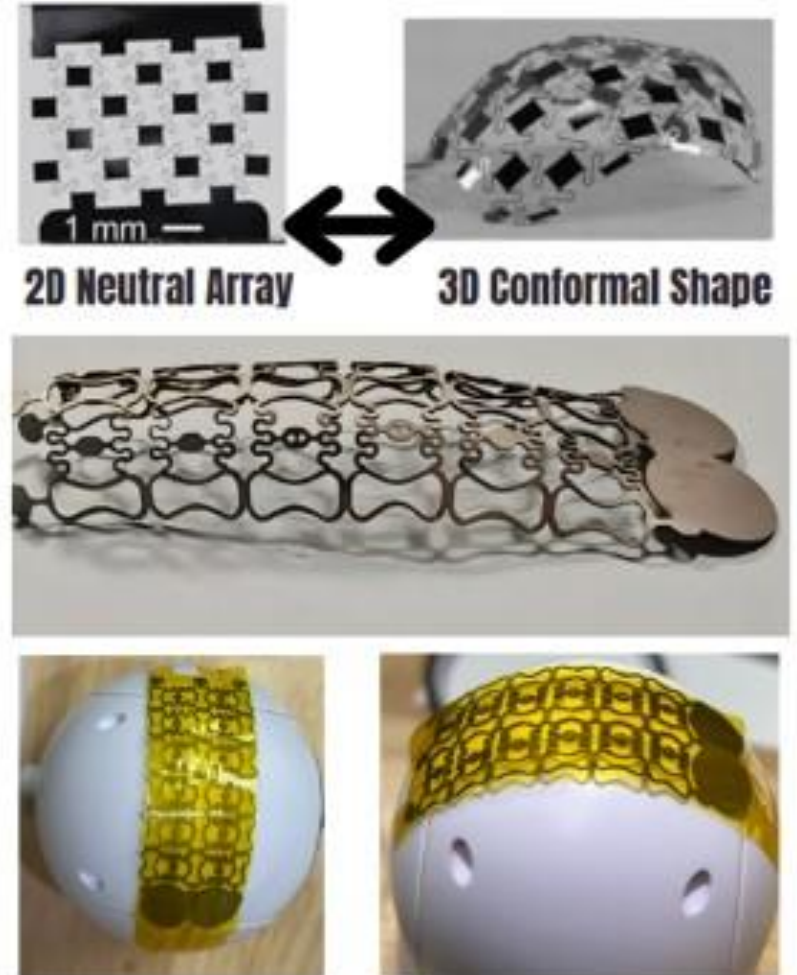
Khanjur R&D example of conformal SMA actuators for conformal electronics

Sabrina Curtis, CEO of Khanjur

sabrina@khanjur.com

Interested in topic 11.6

www.khanjur.com



Guided Particle Overview



VECTOR and NAVI ROBOTICS

Electronic Systems Manufacturing
Advanced Packaging, SWAP-C, WFD,
Research. Decentralized Production
Intelligent Systems



FIELDABLE SYSTEMS

Autonomous Platforms
Sensor and Robotic Processors
Multi-domain Comms/Networks
Data Portals



LAB

FAB

EDGE



SyOH INNOVATION ACCELERATOR

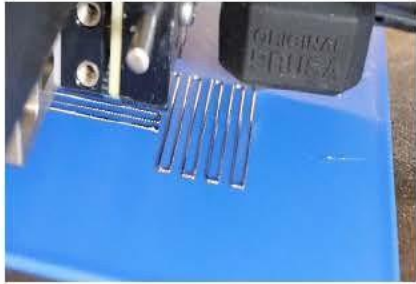
Education & Workforce
Collaboration
Scalable Innovation Networking
Knowledge Accelerator



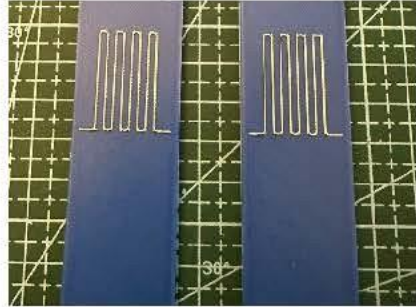


PC 11.0: INTEREST ACROSS PROJECT CALL TOPICS & NEW ADDITIONS

FDM Printed Electronics with Cu29



Cu29 Deposition



Embedded Sensors



Embedded Electronic Components



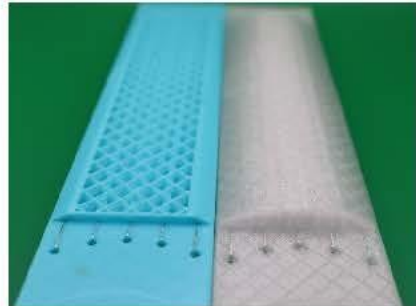
Circuit Features



High & Low Amperage Uses Cases



Dipolar Drone Antenna



Embedded Wiring Harness



Embedded Induction Coil



Flexible Electronics



Omni Directional Strain Gauge

ALL-METAL

Conductive FDM filament

$$1.226 \times 10^{-5} \Omega \cdot \text{cm}$$

Resistivity

NO POST-PROCESSING

no sintering, plating or curing

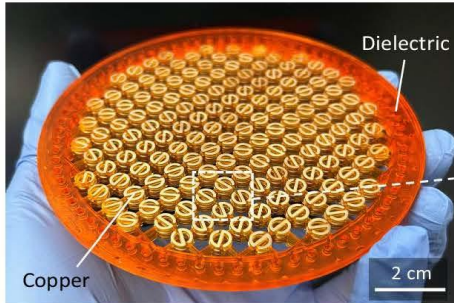
EMBEDDED

electronic components and conductive features

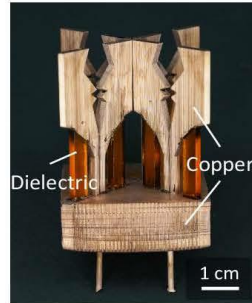
Contact Ian Ramsdell at ian@kuprosinc.com

Game changer: Rapid 3D printing of 3D electronics in minutes

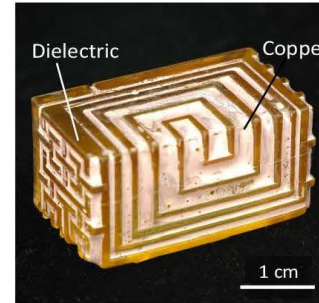
B S-ring gradient phase transmitarray



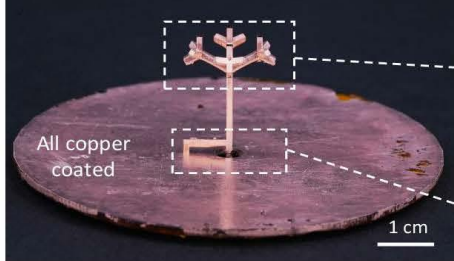
C Vivaldi antenna



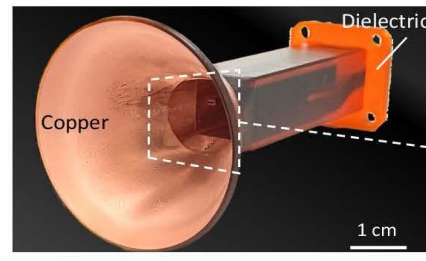
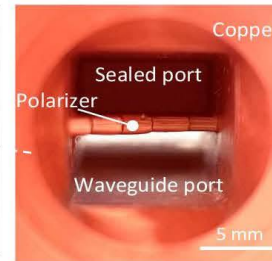
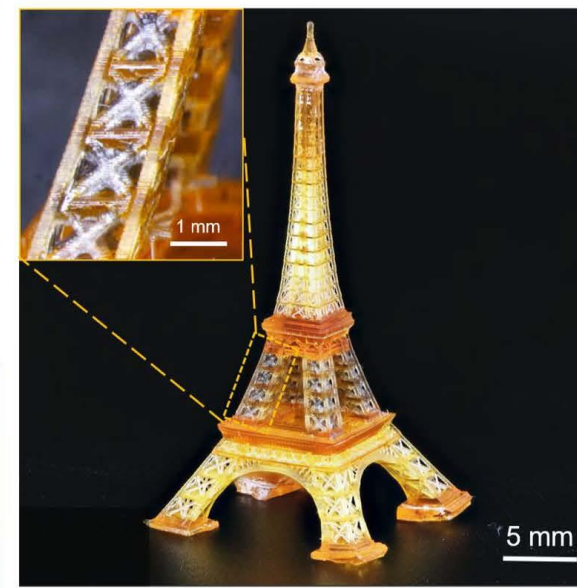
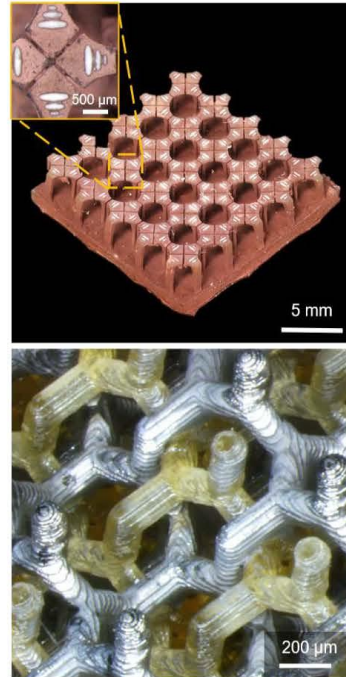
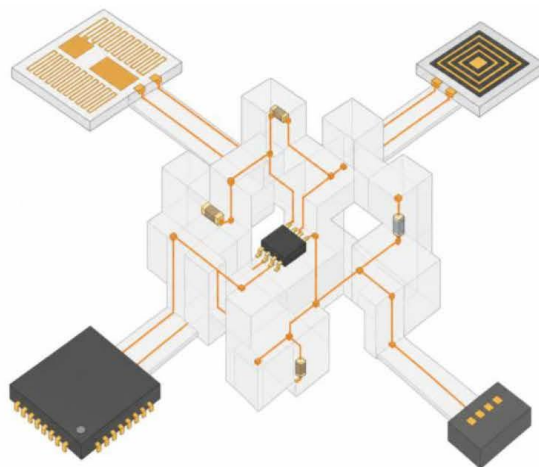
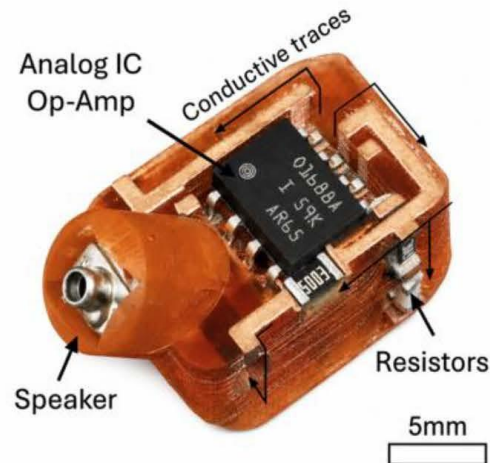
D 3D folded electrically small antenna



E Fractal antenna



F Horn antenna



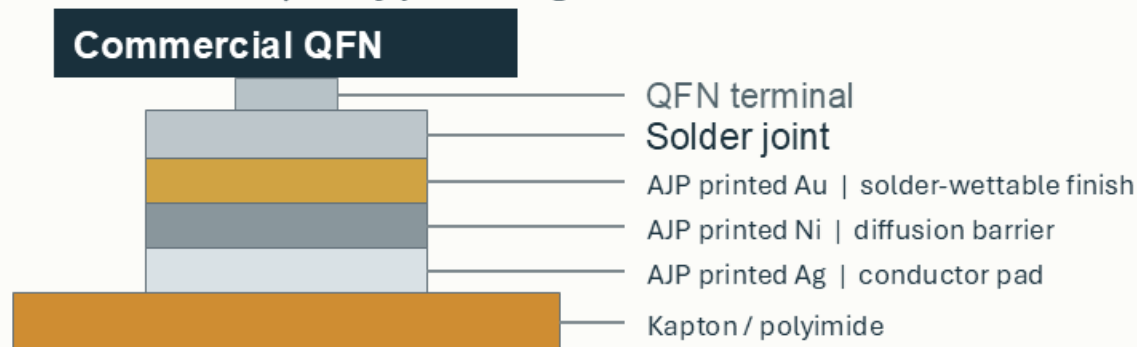
Xiaoyu (Rayne) Zheng, Ph.D.
Contact: Rayne23@Berkeley.edu

Professor, UC Berkeley and co-founder of Desktop Electronics <https://www.raynexzheng.com/>

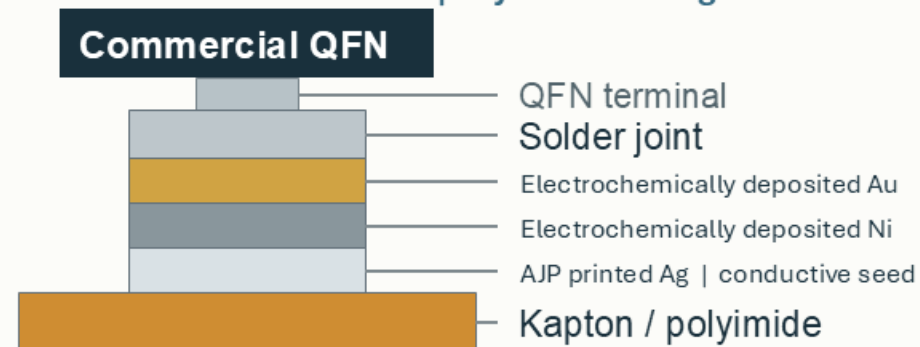
Fully Additive Solderable Interconnects for Flexible Electronics

AJP-printed Ag/Ni/Au pads on polyimide • Hybrid electrochemical finishing as benchmark and fallback

PRIMARY PATH | Fully printed Ag / Ni / Au metallization



BENCHMARK / FALLBACK | Hybrid finishing



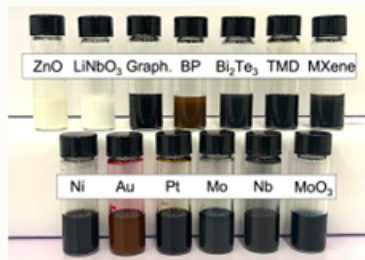
Core Area | Solderability, wetting, joint resistance / strength, aging, flex, and rework

PRINTED PAD CANDIDATES Ag | Ag/Au | Ag/Ni | Ag/Ni/Au

BENCHMARK Printed Ag + plated Ni/Au

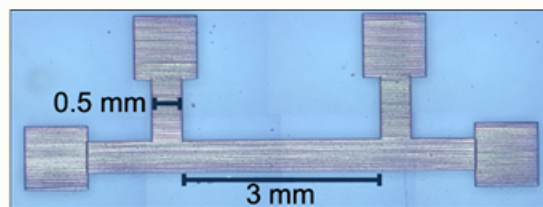
EXISTING TEAM MATERIALS & PRINTING CAPABILITY

Multimaterial Ink library



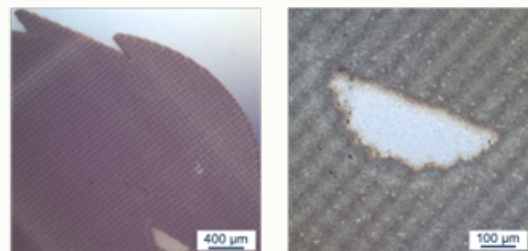
AJP-capable inks include Ag, Ni, Au.

Ag | Printed test structure



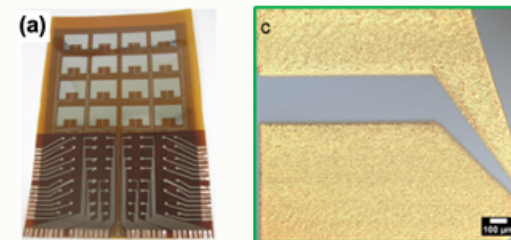
[1] McKibben, Subbaraman, Estrada, et al.
Microsyst. Nanoeng. 9, 51 (2023)

Ni | Printed features



[2] McKibben, Estrada, et al.
ACS Appl. Electron. Mater. 6, 748 (2024)

Au | Printed structures



[3] Varghese, Subbaraman, Estrada, et al.
ACS Materials Au 4, 65–73 (2024)

Inflextech Sensor Fusion based Edge Sensing Autonomy for Harsh Environments (11.6)

PI: Dr. Chandru Ramamurthy, CEO Inflextech (chandru@inflextech.com) UIED HRCMP6BE53Q5 CAGE: 14HX2)

Problem Statement &

Technology

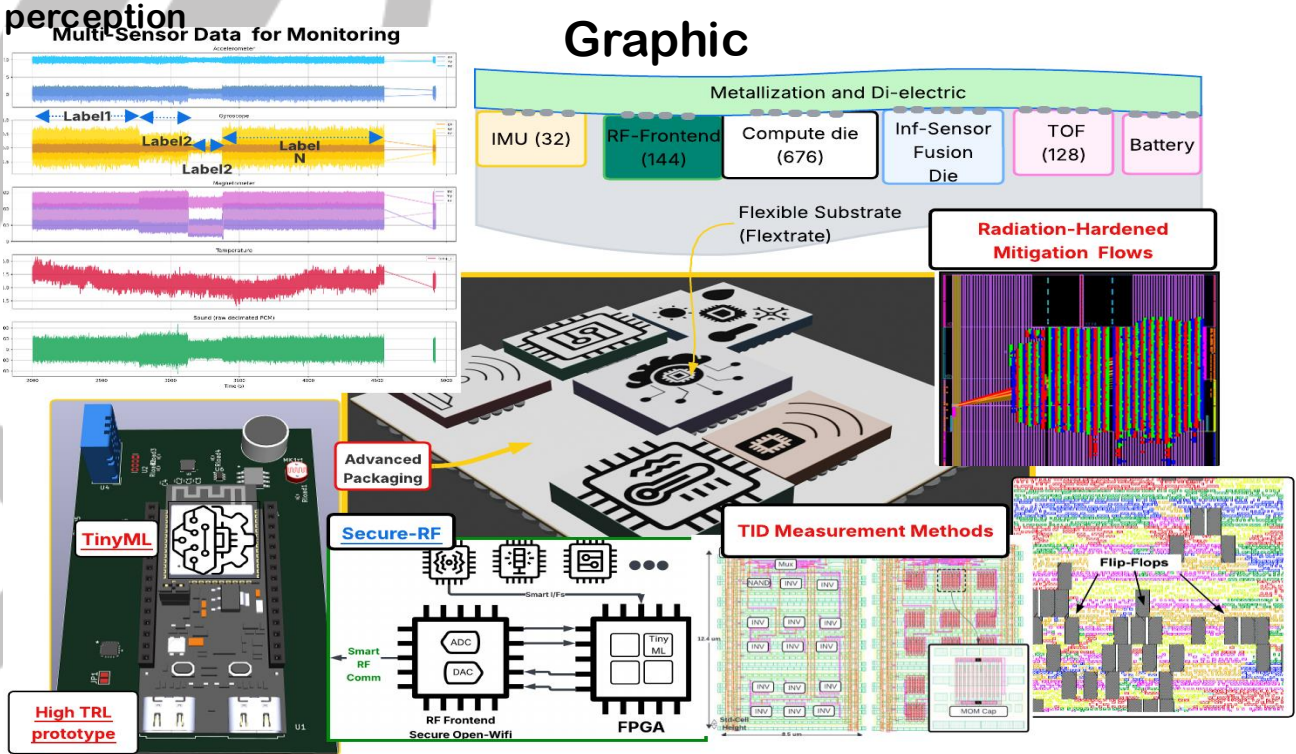
- Inflextech smart edge-sensing plus programmable compute product prototype and advanced miniaturized version of flex substrate or package
- Deploy application specific neural networks for DOW use-cases
- Programmable plus heterogeneous sensor integrated with optimal interface engineering to get the optimal bandwidth for specific application
- Target sub-10 ms, latency, >1TOPS/W inference with sensor fusion at the edge, extreme environments hardening with wireless sensing
- Enabling digital twin deployment on the edge for online learning and perception

Team Capability

- Inflextech brings cutting-edge chip-design, radiation hardening and system technology co-optimization to DOW applications
- Experience with advanced package design and methodology on multiple platforms (Cadence, Synopsys, open-source tools)
- Extreme environment radiation testing of datacenter class photonics and high-speed mixed-signal electronics
- Currently solving sensor orchestration and data compression at the edge with Agni product line
- Collaboration with ASU for radiation
- Collaborations with Univ of Colorado on advanced optical and photonic sensing that can be integrated on package as well

Applications

- Electromagnetic, acoustic, thermal, visible light sensors for deployable for autonomous systems in Army, Navy and USAF
- Use-cases in system monitoring and insights based on real-time data: Anomaly detection and operating statistics of edge assets Embedding RF-antenna/arrays within the back-end of Line in the package to enable optimal efficiency and reduced cost
- Application specific smart sensor-fusion and data-compression pipeline (from Application->PCB->Advanced package) capability
- Low-power edge sensing and autonomy for the warfighter system monitoring meeting MIL standards (Radiation , temperature, vibration, pressure)
- Numerous commercial use-cases leading to physical AI and World models for



proposal@nextflex.us

