

**DuraMat University Consortia**  
**QESST, BAPVC, NGPV**

Poster Number	Capability Name	Short Paragraph Description of Capability (300 words same as the abstract. Summarize what it does and value to DuraMat and Module Materials)	Capability Expert (principal contact)	Organization Name and Type - (National Laboratory NL, Academic Institution - AI, Company- C)	Which Capability Area Best Fits This Work (Select One)	Define from an industry perspective what near term 1 year and long term 5 year successful use of the capability would be. (100 words)	Link to Your Website (if available)
65	BAPVC Methods for Procurement of Industry-Relevant University Research in Module Reliability and Durable Materials	<p>BAPVC is a research consortium that has been created to engage industry members from across the PV module manufacturing value chain in interaction with university scientists to stimulate great innovation and guide the research for near term industrial application. BAPVC will execute its proven approach to identify, select and fund universities throughout the USA to perform industry-relevant research with a specific focus on characterization and development of advanced module materials. The first step in this approach requires bringing industry and academic experts together to assess technology status and discuss opportunities for improvement. BAPVC's 2016 Fall Meeting held October 3-4, 2016 on campus at Berkeley launched this discussion, as more than a quarter of BAPVC's existing research portfolio is devoted to the characterization and development of durable module packaging materials. This paper will present an overview of ongoing work, including:</p> <ul style="list-style-type: none"> <li>• High-resolution quantitative accelerated tests and lifetime models linked to field performance. (Dauskardt – Stanford, Carter – UCSC)</li> <li>• Simple, scalable hybrid barrier and encapsulation systems (Urban – LBNL)</li> <li>• Adhesion benchmarking of state-of-the-art screen printed metallization and quantify root cause metal failure mechanisms (Dauskardt, Reese – NREL, Graham – Georgia Tech)</li> <li>• Multivariate predictive network modeling of degradation (French – Case Western)</li> <li>• Through-the-glass optical analysis of stresses (Collins – Toledo)</li> </ul> <p>BAPVC's industry members are now working independently to synthesize ideas and opportunities discussed in the Fall Meeting into specific guidance that will become the scope of interest for a Request for Proposals (RFP) to be released soon. Evaluation engages both industry and academic reviewers to seek the aforementioned benefit of balanced interaction. Five or more new awards, adding to existing projects, will be placed by March 2017.</p>	John P. Benner	Bay Area Photovoltaic Consortium, Stanford University and University of California at Berkeley	BAPVC	BAPVC will launch 5-7 new university projects addressing a technology scope guided by the industry members and selected by review and evaluation performed by a team equally weighted from industry and academic reviewers	<a href="http://bapvc.stanford.edu/">http://bapvc.stanford.edu/</a>
66	Next Generation PV Center (NGPV) at Colorado state University	<p>The Next Generation PV Center is a NSF supported industry / university corporative research center (I/UCRC) that performs cutting edge research in collaboration with PV industry leaders. NGPV center members includes all aspects of PV value chain. The NGPV brings significant center level capacities for improving the reliability and reducing costs of PV encapsulation. Specific area of expertise /capabilities include</p> <ol style="list-style-type: none"> <li>1. New module architecture development <ul style="list-style-type: none"> <li>- Opportunities to reduce both materials and manufacturing costs while improving reliability demonstrated.</li> <li>- Suitable for thin film superstrate configuration packages.</li> <li>- Module encapsulation process cycle time reduced from 13 minutes to &gt; 30 sec. shown</li> <li>- Credible design pathway to DOE goal of 50 year life demonstrated</li> </ul> </li> <li>2. Long standing expertise in materials and component characterization. <ul style="list-style-type: none"> <li>- Advanced materials selection and manufacturing process selection capabilities</li> <li>- ~90,000 polymers materials in the database.</li> <li>- Opportunity to improve existing designs or develop new systems.</li> </ul> </li> <li>3. Computational simulation of modules and module manufacturing processes. <ul style="list-style-type: none"> <li>- NGPV members are recognized experts in simulation, current ongoing NSF program on high fidelity simulation for solar and other high tech industries.</li> <li>- Advanced simulation methods have incorporated 100 million elements</li> <li>- Specific capacities for thermal gradients but able to model a broad array of physics: mechanical / stress, flux, gas and moisture transmission.</li> </ul> </li> <li>4. Sample and device fabrication <ul style="list-style-type: none"> <li>- State of the art automated fabrication of ~18%+ CdTe devices</li> <li>- Small area devices with different structures</li> <li>- Proto line deposition and laser interconnection scribing capabilities for 42 x 42 cm available</li> </ul> </li> <li>5. Advanced device and materials characterization <ul style="list-style-type: none"> <li>- IR thermography, Electroluminescence (EL, device to module size)</li> <li>- Atomic resolution TEM</li> <li>- Electron microscopy (SEM), X-ray Photoelectron Spectroscopy (XPS), Energy Dispersive Spectroscopy (EDS) and others</li> <li>- Light soaking with varying temperature</li> </ul> </li> </ol>	Kurt Barth kurt.barth@colostate.edu	Colorado State University Next Generation PV Center	NGPV	The first year milestone for the NGPV program will be the development of between two to four specific projects for application driven modeling. Basic materials science principles and state of the art materials identification and new module architectures. Project development, vetting and oversight will be performed in collaboration with the industrial advisory board of the NGPV using existing Center mechanisms. Milestones for year two will be the demonstration of effective execution of these projects and continued industry involvement.	<a href="http://www.photovoltaics.colostate.edu/">www.photovoltaics.colostate.edu</a>