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| D.6 | Title: Multi-Length-Scale Innovations in Damage Evolution in Materials: Characterization, Modeling, and Validation | | |
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| Summary | | | |
| <p>Materials are enabling to all of mankind’s endeavors. Accordingly, all aspects of their usage bring great societal and environmental impacts, whether in manufacturing, energy, transportation, building, agriculture, etc. Materials in routine applications are subjected to stresses increasingly complex and are often simultaneously subject to physical, mechanical, thermal, chemical and radiation constraints. Such complex service environments lead to a greater potential for damage than if a material were subjected to a simple stress state / service environment. Accordingly, to design or optimize materials performances with the composition and architecture tuned for a complex loading environment, the materials science community is working to discover, quantify, and develop understanding of the synergies between these various phenomena to support the development of predictive, physically-based models of material damage.</p> <p>This symposium provides a venue to bring together the global research community working to link advanced diagnostics, 3D material characterization, experiments quantifying damage evolution, model development and validation to highlight the advances in understanding damage mechanisms, experimental characterization, model developments, and validation efforts working to develop physically-based, multi-length-scale models of material damage in complex loading environments.</p> <p>Targeted topics:</p> <ul style="list-style-type: none"> - Numerical tools (e.g. density functional theory, molecular dynamics, cellular automata) to model multi-length-scale damage evolution. - New developments / applications of 3D characterization of material microstructure and damage evolution - New developments in experimental techniques quantifying damage evolution in materials - Multifunctional materials (e.g. stress corrosion cracking, tribo-corrosion) - Advanced functionalities, (e.g. self-diagnosis, self-healing, energy harvesting) | | | |