

In-situ Mechanics

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Today's industrially produced materials and structures generally are very advanced, and as such future breakthroughs will need to rely on detailed novel mechanical understandings. As a reflection of this, the 'In-situ Mechanics' Mini Symposium will focus on the importance of a paradigm change from post-mortem analysis to a new level, where the evolution in mechanical properties are monitored in-situ. The Mini Symposium will highlight the recent rapid expansion of available testing strategies to examine elastic, plastic, and fracture properties of materials, with control of loading mode, temperature, atmosphere, etc. The Mini Symposium covers various scales from characterization at the local scale (micro- or nano-testing) to component/structural scale specimens. The aim is to provide a forum where the latest research on in-situ experimental characterization methods and results, the related data analysis and their inclusion in simulations are presented and discussed. Suggested topics include but are not limited to:

- Time-resolved in-situ LOM, SEM, TEM, AFM, X-Ray etc. testing during mechanical loading (tension, compression, bending, fracture, fatigue...)
- Full-field measurements techniques (e.g., multi-view DIC) at different scales
- Precise specimen loading with accurate force & displacement measurement
- Testing under extreme conditions (high and low temperature, high strain rates, hydrogen environments, radiation,...)
- Local deformation and fracture mechanisms
- Challenges in in-situ data analysis and visualization
- Input to and validation of mechanics simulations by in-situ experimental data
- The need for in-situ mechanical testing in materials design and optimization
- Hybrid testing strategies
- In-situ testing challenges of large specimens