

Mini-Symposium 3-4: Mechanics and Physics of Fracture

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Over and above the fascination with the shapes it creates, understanding how and when fracture occurs is of broad importance, for instance in the design of manufacturing processes, in geophysics for a better understanding of earthquakes, and in mechanical engineering with an obvious societal impact regarding safety. However, fracture is a complex multi-scale, multi-physics phenomenon and a fundamental, mechanism-based understanding is needed to disentangle the underlying, interacting processes.

While significant progress has been reached during the last century on understanding many relevant physical mechanisms, there is still much to be understood. For example, the study of 3D aspects, initiation of fracture and early stages of crack propagation, multi-cracking, destabilization towards complex oscillating crack paths or crack branching, interactions with heterogeneities have recently garnered growing interest. Furthermore, describing cracks and fracture in anisotropic materials, fracture at large deformations or in visco-elasto-plastic materials pose ongoing challenges.

We envision a mini-symposium bringing together a multidisciplinary group of researchers from the fields of continuum mechanics, materials science, solid-state, condensed matter & statistical physics to discuss the recent advances in the field of fracture. The symposium aims at enabling a close dialogue and exchange between the disciplines, in particular by combining physics and mechanics, jointly discussing experiments and simulations, and/or crossing several scales from the atomistic over the micro-, meso- and macroscale.

The symposium is open to all kinds of materials (e.g., metals & alloys, ceramics, polymers, soft materials, concrete & building materials, architected and additively manufactured materials) and types of fracture, including, but not limited to brittle, semi-brittle and ductile fracture, dynamic fracture, adhesion and interfacial fracture, fragmentation and cutting.