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# PLASTICITY AND DAMAGE AT THE MICROSCALE

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## ABSTRACT

Failure of polycrystalline metals is a very complex process that involves several length scales and deformation mechanisms and is strongly influenced by the microstructure.

At the lowest scale, the dislocation content, the stress necessary to move dislocations or the ability of the material to generate dislocations around the crack tip determine its ductility. At higher scales, ductile failure is triggered by the nucleation, growth, and coalescence of voids while brittle fracture happens with very small plastic activity and many times involving cleavage or grain boundary fracture. Modelling all these processes and their interaction is fundamental for a safe and efficient design and to guide the development of new materials with optimal microstructures.

This symposium is focused on the models and simulation techniques aimed at understanding and predicting the failure of metals at the different scales involved in the process, including

- Atomistic approaches
- Dislocation dynamics
- Crystal plasticity
- Twinning models
- Damage models at different length scales
- Phase field fracture
- Cohesive crack and interfacial fracture models
- Multiscale approaches