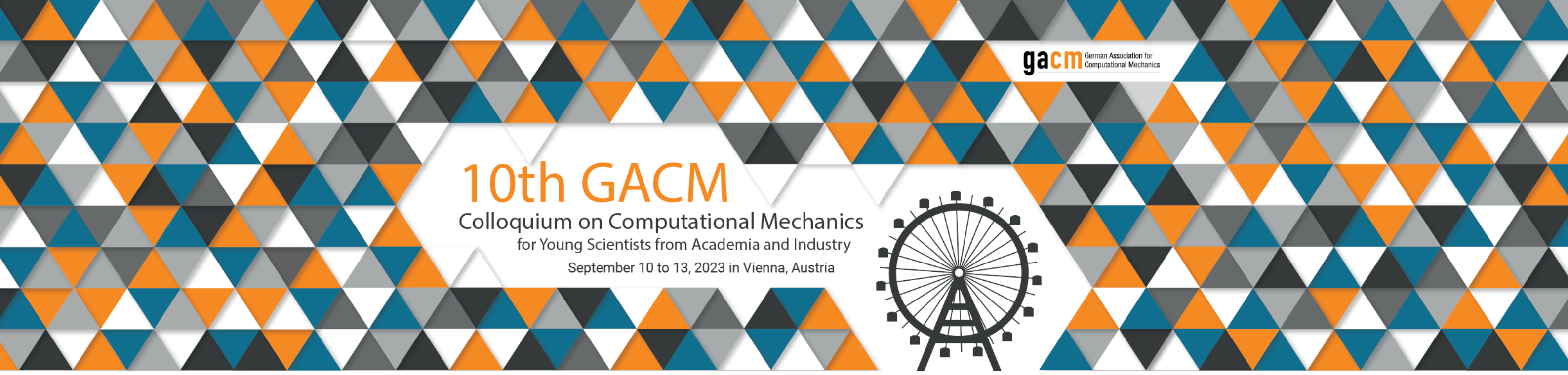

Multiphysical Modeling of Complex Material Behavior

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Technological progress is intimately connected to the development of high-tech materials that push the limits of existing applications and enable new technologies. This begins with alloys such as transformation-induced plasticity (TRIP) steel with properties tailored to specific purposes and ends with materials with architectured microstructures that allow unprecedented properties not seen or found in nature. Scientific progress, moreover, frees materials from their restriction of just being building blocks of complex devices by making materials respond to multiple stimuli and thus smearing the boundary of the notions of material and device. This is the realm of *(multi)functional* or *smart* materials, which are at the core of this minisymposium.
It is their microstructure that is responsible for the unique properties of these materials – no matter whether they were invented by mankind or by mother nature. Hence, a deep understanding of *coupled microstructural processes* and their effect on the material behavior is paramount for modern engineering. In this regard, the importance of predictive numerical modeling cannot be overestimated neither for the simulation of actual applications nor – on smaller length scales – for the investigation and understanding of *complex coupled material behavior*.
Motivated by these considerations, this minisymposium embraces two objectives of multiphysics material modeling: *multiphysical coupled constitutive models* that capture the effective response as accurately as possible, *physical insight* into the underlying processes and phenomena. Moreover, we are deeply convinced that modeling would be nothing without experiments that reveal coupled responses and processes that would have remained beyond human imagination otherwise. Therefore, in addition to materials simulations and models, this minisymposium also welcomes contributions presenting novel insights from *experiments and their impact on modeling*.

Topics of interest include, but are not limited to:

- Mechanics coupled to, e.g., ferroelectricity, ferromagnetism or micromagnetics; thermomechanics, Piezo-, flexoelectric or magnetostrictive effects, (magnetic) shape memory alloys, electrets, liquid crystals, ...
- Evolution of microstructure driven by non-mechanical stimuli or phenomena
- Simulations featuring advanced constitutive models for functional materials
- Instabilities at microstructural level, material stability and phase transforms
- Modeling and simulation of sensors for non-mechanical fields
- Modeling of coupled dissipative phenomena and processes
- Simulations of coupled problems at microstructural level
- Meta-materials in multiphysical contexts
- Experiments revealing coupled material behavior and providing insights and data for material modeling
- ...

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