Functional materials and composites

Martensitic transformations in shape memory alloys /MT in SMAs/

- Research focused on NiTi alloys being by far mostly used SMAs in applications
- Characterization of functional behavior of NiTi subjected to cyclic thermomechanical loadings

Main research topics

- **Functional-structural-corrosion fatigue in NiTi alloys**
  - Fatigue vs. loading conditions
  - Microstructure vs. functional properties and fatigue
  - Thermally vs. stress induced MT
  - Inhomogeneous nature of MT
  - Concurrent MT and plasticity
  - Tunning properties through thermomechanical treatment
  - Corrosion accelerated functional and structural fatigue

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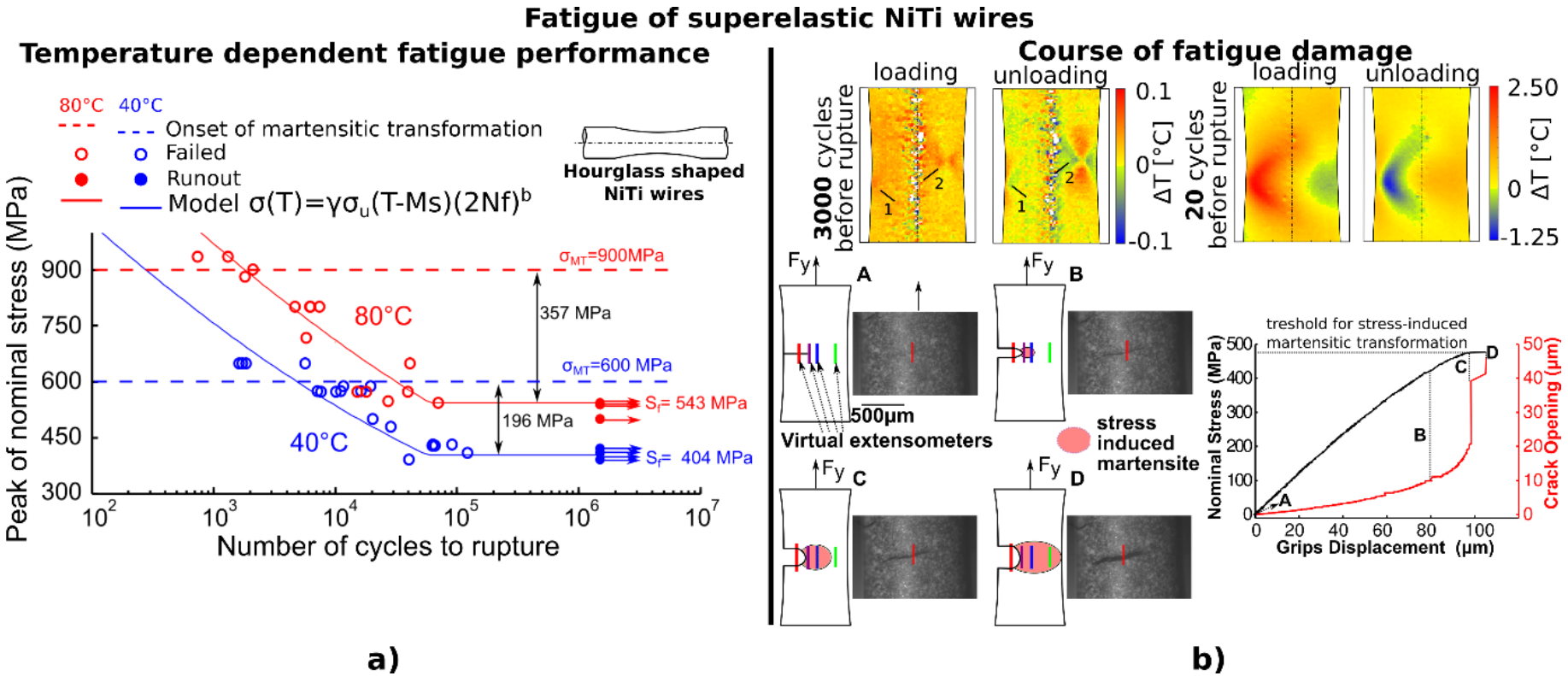
- **Micromechanical resonators with intentionally changeable mechanical properties**
  - Taking advantage of temperature dependent elastic properties of NiTi to engineer microresonators with tunable dynamic properties

Fatigue performance of superelastic NiTi near stress-induced martensitic transformation



Eduardo Alarcon et al., Fatigue performance of superelastic NiTi near stress-induced martensitic transformation, International Journal of Fatigue Volume 95, February 2017, Pages 76–89

- Fatigue performance of superelastic NiTi drops to few thousands cycles when reaching superelastic regime – regime of cyclic martensitic transformation.
  We carefully evaluated the drop finding out that fatigue limit is far below the stress triggering martensitic transformation.
- We evaluated temperature dependence of the fatigue limit and suggested a model relating the fatigue limit to the temperature of martensitic transformation
- We evidenced how inhomogeneous martensitic transformation enlarges crack opening thus accelerating crack growth.