



**Czech Society for Mechanics
and Institute of Thermomechanics, CAS**

invite you to a lecture and discussion within the lecture series **Institute of Thermomechanics Seminar**

Multi-Scale Structural Gradients Optimize the Bio-Mechanical Functionality of the Spider Fang

given by

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The spider fang is a natural injection needle, built as a multi-scale composite material with outstanding mechanical properties. In this study we introduce a hierarchical modeling for the spider fang, based on computer tomography and SAXS measurement, and analyze the correlation between the fang architectural motifs and its macroscopic elastic behavior. Analytical methods and Finite-Element simulations are used for the mechanical analysis and the effects of small- and large-scale structural gradients on the macroscopic mechanical properties are investigated.

It is found that the multi-scale structural gradients of the spider fang optimize its performances in term of load-bearing stiffness and strength, and that the naturally evolved fang architecture provides optimal mechanical properties compared to other alternative structural configurations.

Reference:

Bar-On B., Barth Friedrich G., Fratzl P., Politi Y., 2014, "The Spider Fang: Biomechanical Functionality Enhanced by Multi-Scale Structural gradients", Nature Communications, 5.

**The lecture will be held on Tuesday, August 17, 2017 at 10:00 in the building
of the Institute of Thermodynamics (lecture room B), Dolejškova 5, 182 00 Prague 8**

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