Universität Münster

Allgemeines Physikalisches Kolloquium

Donnerstag, 10.04.25 – 16 Uhr c.t.

IG1 – HS 2 | Wilhelm-Klemm-Str. 10

Kolloquiums-Kaffee ab 16 Uhr vor dem Hörsaal

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Jun.-Prof. Dr. Diana Khoromskaia

Institut für Theoretische Physik, Universität Münster

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Antrittsvorlesungen

Physics of tissues as active multi-scale materials
Jun.-Prof. Dr. Diana Khoromskaia

Thermodynamics of defects in alloys' microstructures
Prof. Dr. Reza Darvishi Kamachali

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Physics of tissues as active multi-scale materials

Jun.-Prof. Dr. Diana Khoromskaia

Biological soft matter displays a rich repertoire of complex behaviours, ranging from self-generated forces and motility in individual cells to the emergence of intricate shapes of growing tissues. Inherently driven out-of-equilibrium, these living materials have motivated the advancement of active matter theories which have helped to uncover the physical principles underlying multicellular organisation. In this talk, I will discuss models of epithelial (2D) tissues as active viscoelastic curved surfaces and as collections of tightly packed cells. These multi-scale approaches elucidate how shape and mechano-chemical patterns self-organise in developing tissues and offer the potential to guide behaviours in synthetic contexts, such as in organoids.

Thermodynamics of defects in alloys' microstructures

Prof. Dr. Reza Darvishi Kamachali

Crystal structures have many common features with human beings, both exhibiting remarkable order and organization but ultimately ruled and fated by their defects. Understanding these defects is key to unraveling the fundamental principles governing both life and materials. However, since life and human nature are far too complex to decode in a single talk, we take the easier route—starting with the defects in crystals. In this talk, we overview recent developments in studying the interaction between microstructural defects and solute species and how these can be modeled to improve the prediction and design of microstructures. Examples in steels and aluminum alloys will be demonstrated. We will distinguish and link the concepts of segregation and co-segregation to the thermodynamic state and properties of an interfacial defect, particularly its solubility and phase behavior.