

# SEMINAR SERIES

Supported by The Department of Biomechanics and  
The Center for Research in Human Movement Variability (MOVCENTR)



## Magnetic Rotational Spectroscopy with Nanorods for Studying Clotting and Rheology of Insect Blood

Featuring Dr. Kostya Kornev  
Clemson University

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Friday, Sept. 29 | 10:00 am – 11:00 am | BRB 167

### PRESENTATION ABSTRACT

Magnetic nanorods are attractive probes enabling the characterization of rheological properties of complex fluids and gels within milliseconds at milli-Tesla magnetic fields. This talk will address the current challenge of the in situ characterization of minute amounts of fluids rapidly changing their rheological properties. Magnetic Rotational Spectroscopy (MRS) with ferromagnetic nanorods will be introduced, and specific features of rotating nanorods in Newtonian and non-Newtonian fluids will be explained. New MRS discoveries on the physiology of hovering insects and an explanation of the fast clotting kinetics of insect blood will be discussed. If time allows, I will show that MRS provides rich physicochemical information about the gelation processes of polymers and sols.

### ABOUT DR. KORNEV

Dr. Kostya Kornev is Dean's Distinguished Professor in the Department of Materials Science & Engineering at Clemson University, SC. His Arthropod Inspired Materials & Surfaces or AIMS-Lab studies the mechanisms of materials organization in arthropods spanning different scales, from nano- to micro- to macro-scales. The lab works on elucidation of the arthropod mechanisms of food uptake, transport, and extraction; sensing, actuation, and deployment of feeding and sensing devices; and stimulus-responsive changes in materials properties of their blood. To investigate these systems, the lab develops new tools, techniques, and theories. Dr. Kornev pioneered the development of Magnetic Rotational Spectroscopy (MRS) with magnetic nanorods to study the rheology of nanoliter droplets and thin coating films. His group developed Drop-on-Demand electro-printing technology for printing highly viscous fluids that are up to  $10^4$  thicker than water. Dr. Kornev graduated with a PhD degree in Physics & Mathematics from Kazan State University (KSU) in Russia in 1988 and stayed there until 1990 as a lecturer. In 1990 he was invited by Prof. V.M.Entov to join the Institute for Problems in Mechanics of the USSR Academy of Science in Moscow. In 2000, he joined the Textile Research Institute in Princeton, NJ and then the faculty at Clemson University in 2006. He is recipient of the 2013 Award for the Outstanding Faculty Achievements in Science of the College of Engineering & Science of Clemson University, 2017 Theodore Von Karman Fellowship of RWTH Aachen University in Germany, and 2018 Founder's Award of the Fiber Society.

more info at [cobre.unomaha.edu](http://cobre.unomaha.edu)

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