MECHANICAL ENGINEERING SEMINAR

Monday, March 11, 2024, at 14:30, D. Dan and Betty Kahn Building, Room 217

Online: http://technion.zoom.us/BestSeminarEver

Additive Manufacturing: the Optimal Process Window

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Hosted by: Prof. Doron Shilo

As Additive Manufacturing (AM) technology is finding more applications in various industries, the need for increased quality of the product is higher than ever. Along with the safety concerns, the quality improvements are forcing practitioners to explore the lower power limit of the Optimal Process Window (OPW) of AM. In my presentation I will discuss the physical and metallurgical restrictions of OPW, like keyhole instability, vapor depression, and beading up, with the specific emphasis on the lack-of-fusion boundary of the window. I will discuss the importance of the latent heat effects in AM, which so far have not been adequately accounted for in theoretical/computational research. I will also suggest a simple, straightforward experiment to verify these effects, which may be easily carried out in an academic laboratory setting.

Seminars Coordinator: Assoc. Prof. Shmuel Gal.

About the Presenter

Alex Umantsev is a Professor of Materials Physics in the Department of Chemistry, Physics, and Materials Science at Fayetteville State University in North Carolina. He earned his doctorate in 1986 in Moscow (Russia) developing the first successful computer model of the dendritic growth and pioneering research on thermal effects of phase transformations and physical consistency of the newly introduced field-theoretic method. In the early 1990s he worked as a research associate at Northwestern University. After that he began his teaching career. His research interests span the areas of materials theory and multiscale modeling of phase transformations from traditional small-molecule metallic or ceramic systems to crystallization of macromolecules of polymers and proteins. He has always been interested in the processing-structure-properties relations of materials ranging from their production to the analysis of their failure.