

You are cordially invited to attend this seminar to be held on

Monday, April 24th, 15:00
Room 118, Wolfson Mechanical Engineering Building

Venus of Moravia and Reconfigurable Nanoelectronics: 30,000 years of Ceramics Engineering

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The oldest existing (wo)man-made materials are 28'000-years old ceramic objects, found near Brno (Czech Republic). Modern ceramics technology follows similar production principles but the scale has changed: A sub 10 nm brick-by-brick design is feasible and in-situ reconfigurable micro- and nanostructures are more than mere objects of the imagination.

The seminar will be focused on a particular group of ceramic materials called ferroelectrics and the research towards their implementation in reconfigurable nano-electronics. Ferroelectrics are part of so-called 'smart materials', materials that change their properties under external stimuli. They are widely used in electronics and communications, electromechanics, and acoustics. An important feature, inherent to all ferroelectrics, even in a perfect single crystal form is the existence of domain walls. These are internal interfaces, 1-3 nm wide, that can be manipulated by voltage pulses or mechanical stress.

For the past 5 years, the internal structure and properties of domain walls have been intensively studied. We have learned to position and displace them, functionalize them, and make domain wall arrays having desired patterns. Among the obtained results are domain walls with metallic conductivity inside the electrically insulating ferroelectric, dense patterns of domain arrays having <10 nm periodicity, monitored displacement of domain walls, and a demonstrated reconfigurability, promising new possibilities for domain-wall control and its utilization.



Nava Setter, completed MSc in Civil Engineering at the Technion and PhD in Solid State Science at the Pennsylvania State University. She has been professor of Materials Engineering at the EPFL – Swiss Federal Institute of Technology since 1989 and recently joined the Materials Science and Engineering Department at the Tel-Aviv University.