Theoretical investigations of interfacial effects in nanoscale structures

Abstract:
Nanoscale structures such as supported ultrathin oxide films are of interest in a number of technological applications. On the other hand, oxide-supported metal nanostructures are also of interest, as catalysts, for example. In this work, we show that ultrathin transition metal oxides exhibit remarkable flexibility and can distort to fit the substrate on which the oxide is grown. This distortion gives rise to novel structures and properties distinct from those of bulk oxides. Moreover, when ultrathin oxides are in turn used as supports for ultrathin metal catalysts, the buried metal/oxide interface can distort in response to adsorbates on the metal, thereby stabilizing adsorption. This suggests that more effective oxide-supported metal catalysts can be designed by replacing traditional oxide supports with ultrathin oxide films.

About the speaker:
Miss Quek Su Ying is a Ph.D. student who is currently undertaking her doctorate studies at Harvard University, USA. In 2004, she was awarded Master of Arts in Mathematics at Christ’s College, University of Cambridge, UK. She is also a finalist of the Lee Kuan Yew Award for Mathematics & Science. She was invited to annual Canada/USA Math camp by the Mathematics Foundation of America based on results in American Invitational Mathematics Examinations.

Her research work involves the understanding the atomic and electronic structure of nano-scale materials & their influence on catalysis.

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