2022 IBS-CALDES Special Seminar

- **Speaker : Prof. Wolf-Dieter Schneider (EPFL, Switzerland)**
- **Venue : Seminar Room 302, Science building #3**

✓ **Date & Time : Wednesday, November 9 at 2:30PM**

✓ **Title : Mesoscopic structures in ultrathin silica films**

Kristen M. Burson,[1] Hyun Jin Yang,[2] Daniel S. Wall,[1] Thomas Marsh,[1] Zechao Yang,[2] David Kuhness,[2] Matthias Brinker, [2] Leonard Gura,[2] Markus Heyde,[2] Wolf-Dieter Schneider,[2] and Hans-Joachim Freund[2]
1) Hamilton College, 198 College Hill Road, Clinton, NY, 13323 USA
2)Fritz-Haber-Institut der Max-Planck-Gesellschaft, Faradayweg 4-6, 14195 Berlin, Germany,
(corresponding author W.-D. Schneider, e-mail: wolf-dieter.schneider@epfl.ch)

Silica films can be prepared in both, crystalline and vitreous forms as well as of mixtures between them. In the past, the atomic-scale structure of this film system has been in the center of interest. However, at a larger scale, mesoscale structures like holes and substrate steps can play an important role for confined space reactions and other applications of silica films. In the present investigation we report on mesoscale structures in silica films grown on Ru(0001) in ultra-high vacuum, and probed with scanning tunneling microscopy (STM). We find that silica films can exhibit coexisting phases of monolayer, zigzag, and bilayer structures. These coexisting phases were observed to be influenced by holes in the film structure and also by atomic-scale substrate steps. Specifically, film regions bordering holes in silica bilayer films exhibit vitreous character, even in regions with predominant crystalline film structure.
The present characterization of mesoscale structures in Ru-supported ultrathin silica films provides a scale-up of the former atomic-scale investigations with implications for catalysis and chemistry in confined space. Specifically, the transition from the amorphous to the crystalline phase near film holes is an exciting observation which may be expected to have implications for structural control of materials.

This project has received funding from the European Research Council (ERC) under the European Unions Horizon 2020 Research and Innovation Program (Grant Agreement No. 669179).

Organized by Director Han Woong Yeom (yeom@postech.ac.kr, 054-279-2091)