

EPFL Valais, ChE 602 Seminar, 29.09.2016

Title: Thin films of metal-organic frameworks: The search for new deposition methods and applications

Abstract:

Metal-organic frameworks (MOFs) are an intriguing class of porous crystalline materials with record internal surface areas. There is tremendous potential for integrating MOFs into microelectronics, e.g. as active sensor coatings, low-k dielectrics and tunable conductors. A key enabling step in leveraging the properties of MOFs in microelectronics will be the development of robust thin film deposition methods. Thus far, typical procedures for the deposition of MOF thin films are incompatible with microelectronic fabrication because of corrosion and contamination issues.

We recently demonstrated chemical vapor deposition (CVD) of MOF thin films (Nat Mater 2016, 15, 304–310). The MOF-CVD process allows conformal growth of thin films and extends MOF processing to one of the most commonly used techniques in thin film research and manufacturing. Two important challenges were tackled to realize this process: vapor phase supply of precursors and crystallization at the vapor-solid interphase. To our knowledge, this is the first vapor phase process for conformal film deposition of a crystalline and microporous network material. Potential applications of MOF-CVD coatings will be discussed.

Bio:

Rob Ameloot obtained his Ph.D. in Bioscience Engineering/Catalytic Technology at KU Leuven (Belgium) with Dirk De Vos in 2011 and was awarded by the Royal Academy of Belgium for this work. In 2012–2013, he worked with Jeffrey Long as a Fulbright postdoctoral fellow at UC Berkeley (US). Currently, he is a tenure-track research professor at the KU Leuven Centre for Surface Chemistry and Catalysis. He is passionate about pushing the envelope in porous materials and process technology, with a healthy disregard for traditional subject boundaries.