

## ENERGYPOLIS SEMINAR

9. 6. 2016, 11:15 - 12:15, ENERGYPOLIS Sion, 4<sup>th</sup> floor, Seminar room

### Tuning the Redox Properties of Cobalt Particles Supported on Oxides by an In-between Graphene Layer

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The metal-support interaction (MSI) plays an important role in heterogeneous catalysis. Understanding and tuning the MSI are essential steps for developing catalysts with high performance. In this work, a new concept, which is coating the oxide supports with a single layer graphene, was introduced to modify the MSI. The influence of graphene layer on the metal (Co and Co-Pt) – oxide (ZnO and SiO<sub>2</sub>) interactions and on the redox properties of metal particles were evaluated through model catalyst systems. The results showed that single layer graphene can significantly influence the oxidation states and morphologies of both mono Co and bimetallic Co-Pt as compared to the one after direct deposition on bare oxides. In particular, under vacuum annealing, graphene protects Co from being oxidized by ZnO and results in Co-Pt metallic mixture. Co interacts with oxide substrates forming flat particles which are easily oxidized by low pressure O<sub>2</sub>, while insertion of a graphene interlayer between the metal overlayer and the oxide supports leads to the formation of highly dispersed Co nanoparticles, which are resistant to oxidation. Under H<sub>2</sub> reduction condition, graphene evidently facilitates the reduction of Co. The deposition amount of Co, the oxide substrate, the annealing temperature and the environment were proved to influence the stability of graphene. These results explore new directions for the possible future of using graphene as a promoter in catalytic reactions.



**CV: Dr. Wen LUO**

Wen LUO received the B.Sc. degree in chemical engineering and the M.Sc. degree in chemical technology from Sichuan University, Chengdu, China, in 2009 and 2012, respectively. Then he joined Dr. Spiros Zafeiratos' group as a Ph.D. candidate and received his Ph.D. degree in physical chemistry from Université de Strasbourg, Strasbourg, France, in 2016. His current research interest focus on graphene-based materials and their applications in catalysis and energy field.