Max-Planck-Institut für Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter

Thursday, December 6th, 2018 – 14:00 p.m.
CFEL Seminar room IV (Bldg. 99)

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Nano Surface Science and Engineering for Energy Conversion and Diamond Transistors

Nano science and technology offer a vast and fascinating playground to explore the novel physiochemical properties of nanomaterials with the development for various applications including energy conversion and electronics. In this talk, I will present the recent investigation on the surface chemistry and physics and their effects on the nanoscale electro/photo-catalysis and diamond-based surface charge doping, such as surface molecular tunable crystal phase engineering with two-dimensional (2D) WS_2 towards stable electrocatalytic hydrogen evolution reaction, surface oxygen vacancies from MgO porous nanoparticles for stable photocatalytic water splitting with gold's local plasmonic further enhancement; and hydrogenated MoO_3 layer as a novel efficient sustainable surface charge acceptor for diamond transistors. These surface science and engineering enable the enhancement of functional efficiency and the extension of performance stability in electro/photo-catalysis and electronics. This talk highlights the synergistic surface science and engineering can provide the opportunities to customize nanomaterials for advanced applications development.

Host: Angel Rubio

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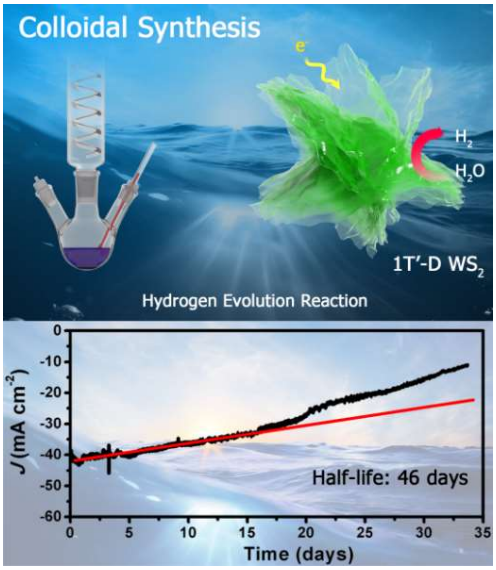

Figure 1. Colloidal Synthesis of 1T'-WS2 for stable electrocatalytic hydrogen evolution

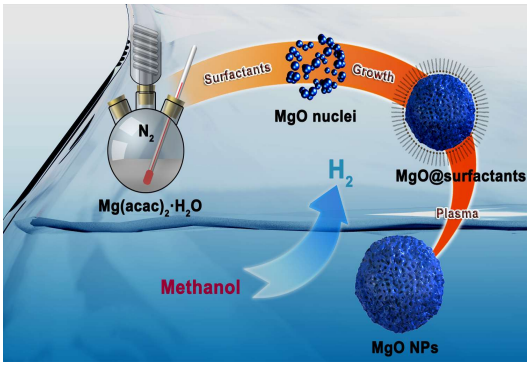

Figure 2. Monodispersed MgO porous nanocrystals for photodecomposition of methanol to CO_x-free H_2 fuel production

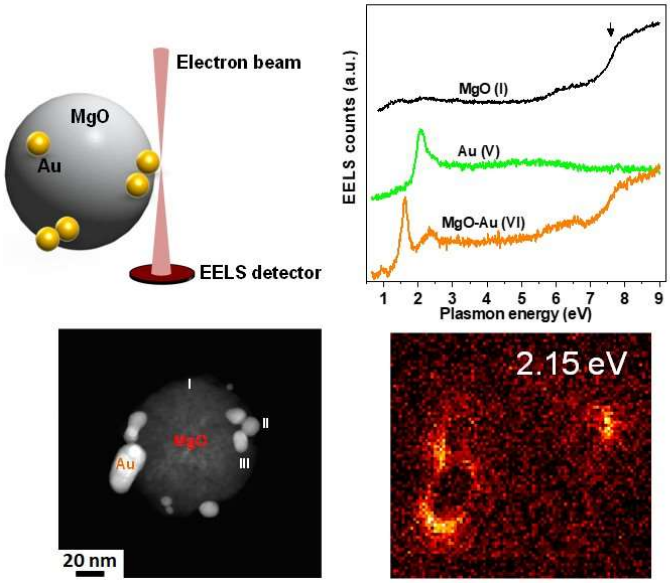

Figure 3. Electron Energy Loss Spectroscopy (EELS) measurements of plasmon resonances of Au-MgO nanostructure to be applied for water splitting

References

[1] Z. Liu, et. al., *Nano Energy*, 50 (2018), pp. 176-181.
[2] Z. Liu, et. al., *Sci. Adv.*, 2 (2016), e1501425.
[3] Z. Liu, et. al., 2018 under submission.