

ENERGYPOLIS SEMINAR

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Electrodeposition Applied for preparation of Functional Materials

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Electrodeposition is a process of reducing metal cations in an electrolyte to a solid metal using electric current. Metals, alloys and metal composites with different functions can be obtained by adjusting the composition of electrolytes and electrodeposition process conditions. This report mainly introduces the research developments of Prof. Maozhong An's research group in the field of electrodeposition of functional materials. One part of the report presents preparation of functional materials by electrodeposition in aqueous electrolytes, including non-cyanide electrodeposition of gold and silver noble coatings, electrodeposition of zinc-nickel and nano-zinc corrosion resistant coatings, electrodeposition of Au-Pt alloy and Co-Se alloy electrocatalysts, composite electrodeposition of Sn/SiC solderable coating, and composite electrodeposition of nickel/diamond ultra-thin blades. Another part of the report presents preparation of functional materials by electrodeposition in ionic liquid electrolytes, including electrodeposition of CIGS photoelectric conversion coatings, electrodeposition of Co nanowires and Sm-Co alloy magnetic recording materials, electrodeposition of Li-Cu alloy electrode materials, and electrodeposition of gold noble coating. In addition, functional materials prepared using other methods by Professor An's group will be introduced briefly, such as Cu-N-C electrocatalytic materials, SnO₂/graphene composite anode materials and ionic liquid based electrolyte membranes.

References:

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- [2] Qingyang Li, Maozhong An*, et al. Insight into the Role and Its Mechanism of Polyacrylamide as an Additive in Sulfate Electrolytes for Nanocrystalline Zinc Electrodeposition. *Journal of The Electrochemical Society*. vol. 163, pp. D127-D132, 2016.
- [3] Jianhua Deng, Jinqiu Zhang*, et al. Effect of BEO in the electrodeposition process of Ni/diamond composite coatings for preparation of ultra-thin dicing blades: Experiments and theoretical calculations, *Ceramics International*. vol.44, pp. 16828-16836. 2018.
- [4] Jie Zhang, Maozhong An*, et al. Electrochemical Study of the Diffusion and Nucleation of Gallium(III) in [Bmim][TfO] Ionic Liquid. *Electrochimica Acta*. Vol. 190, pp. 1066-1077, 2016.
- [5] Xiaona Pan, Peixia Yang*, et al. A piperidinium-based ester-functionalized ionic liquid as electrolytes in Li/LiFePO₄ batteries. *Ionics*. vol. 23, pp. 3151-3161, 2017.



CV: Associate Prof. Jinqiu ZHANG

Born in 1979 in Heilongjiang, China. Jinqiu Zhang graduated with a Ph.D in Chemical Engineering and Technology from Harbin Institute of Technology (HIT) in 2009. She works at Department of Electrochemical Engineering of HIT, with Prof. Maozhong An and Prof. Peixia Yang. The research group focuses on green electrodeposition method and functional materials, including electrocatalysts, battery materials, anti-corrosion materials, welding materials, wear-resistant materials, etc.