Unifying Catalysis Through Synthesis of Hybrid Materials

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Abstract

Current research activities in materials chemistry are devoted to the development of innovative and abundant materials suitable for conversion and storage of solar energy into chemicals (artificial photosynthesis). At the same time, there is an enormous demand for innovative new materials for energy-saving in electronic devices. Transparent conducting oxides (TCOs) are key components in organic light emitting diodes (OLED's) for solar cells, photocatalysts, transparent electrodes in displays and Field Effect Transistors (FET). Unfortunately, transparent electrodes in flat-panel technology, photovoltaics or FETs rely on expensive indium tin oxide (ITO; In_2O_3:Sn doped with 5% Sn) which generate a bottleneck for the growing demand, combined with the relatively low abundance of indium. Changing the chemistry and using alternative materials systems based on abundant metal oxides provides a solution: Applying the concept of molecular metalorganic single-source precursors opened new doorways to innovative new TCO materials for biofuel cells and clean hydrocarbon catalysis (Fig. 1). [1-7] In my talk the key role of materials design and synthesis for defragmenting catalysis will be discussed.

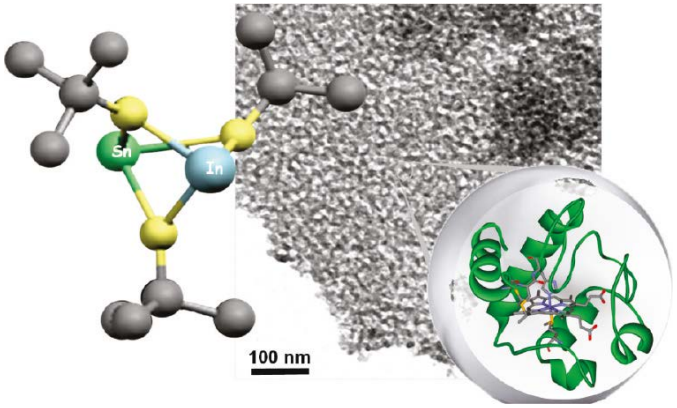

Figure 1. From a molecular precursor to a bioelectrocatalytic device based on tin-rich ITO.

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