

Novel Layer- and Oxygen-Engineered Functional Oxide Materials

Maarit Karppinen & Hisao Yamauchi

Department of Chemistry, Aalto University, Finland

Various exciting families of layer-structured and/or oxygen-nonstoichiometric oxide materials including the high- T_c superconductive copper oxides, thermoelectric misfit-layered cobalt oxides, related cobalt oxides with high ionic-conductivity or oxygen-storage capacity and nature-inspired inorganic-organic hybrids are investigated as highly promising material candidates for a number of emerging new technologies. In order to (i) expand the material frontier of such materials, and to (ii) shape them into optimized performance, advanced/novel layer-engineering and oxygen-engineering approaches should be innovatively searched for. Here we present a short summary of our recent efforts focused on layer-by-layer design, precision synthesis, oxygen-content control and nanostructuring of novel functional materials based on active metal-oxide layers. In these efforts, experimental methods such as ultra-high-pressure synthesis, atomic layer deposition and redox-chemical tailoring have been playing central roles.