Ionic Liquid Thin Film Technologies for Catalysis

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The so-called "Supported Ionic Liquid Phase (SILP)" catalysis concept is based on a classical homogeneous catalyst that is dissolved in a thin film of ionic liquid with the latter being dispersed over the high internal surface area of a porous support. In SILP materials the dissolved catalyst still acts microscopically as a homogeneously dissolved metal complex in its uniform ionic liquid environment, while – macroscopically – a dry solid forms that can be processed in reactor concepts traditionally applied in heterogeneous catalysis, e.g. fixed-bed reactors. The Solid Catalyst with Ionic Liquid Layer (SCILL) concept, in contrast, is based on a traditional heterogeneous catalyst material. The latter is coated with a thin film of ionic liquid or molten salt to induce specific modifications of the catalytic performance. Our contribution will present first the preparation and characterization of SILP and SCILL materials and their applications in hydroformylation and water-gas-shift (WGS) catalysis (SILP catalysis) as well as in methanol steam reforming and ammonia decomposition (SCILL catalysis). As a particular highlight, attempt to combine the SILP and the SCILL approach in a bifunctional catalyst material for the hydroisomerization of octane will be presented.