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Supported ionic liquid phase (SILP) materials in catalysis and separation

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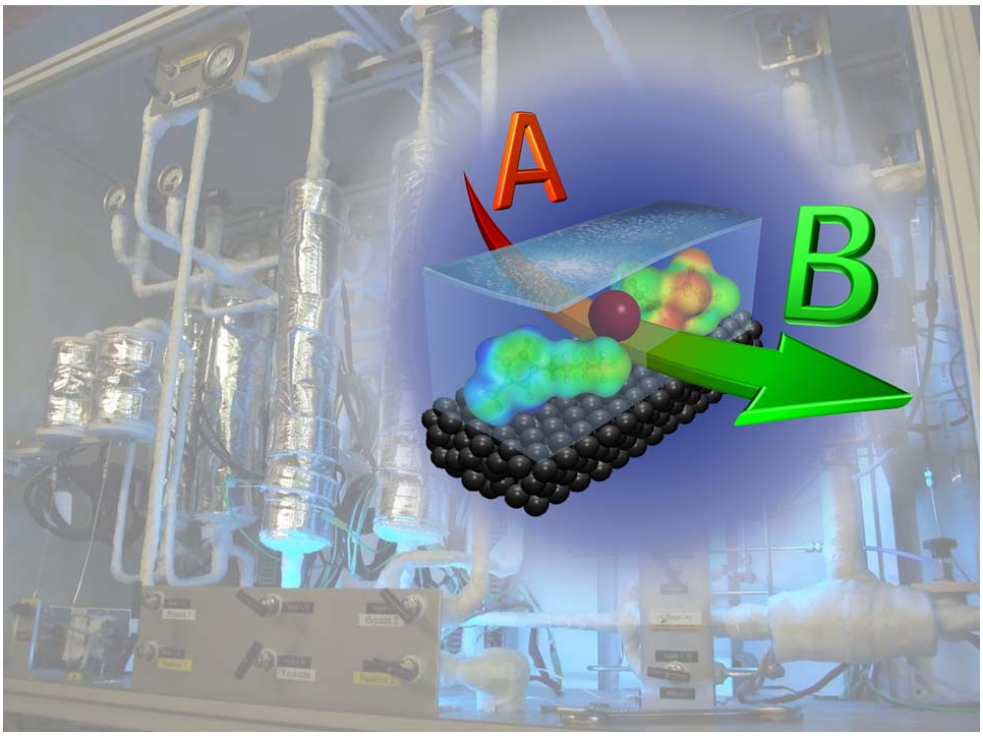

Novel Supported Ionic Liquid Phase (SILP) materials consist of an ionic liquid, dispersed as a thin film on the inner surface of a highly porous solid material. By dissolving homogeneous transition metal complexes in the ionic liquid film, the SILP concept allows tailor making of solid materials with definite properties and a controlled chemical reactivity. Since the ionic liquid is dispersed on the inner surface of the support, a dry solid material is obtained. These materials can be handled like classical heterogeneous catalysts and are highly attractive for large scale applications. Due to the extremely low vapor pressure of ionic liquids, the SILP concept is especially suited for continuous gas-phase reactions. No leaching of ionic liquid and catalyst can occur via the gas-phase and the SILP catalyst remains intact under steady state conditions for more than 1000 hours time on stream. Since the catalyst is retained inside the reactor, only products and non-converted substrates leave the reactor, thus simplifying the downstream processing significantly.
The latest developments of SILP materials in catalysis and gas purification are highlighted. In catalytic applications with syngas the SILP catalysts allow completely new process designs, transferring liquid-phase reactions into continuous gas-phase reactions. Cascade reactions combining endothermic dehydrogenation and exothermic hydroformylation are presented. Water-gas shift catalyst based on SILP technology outperform commercially available heterogeneous catalysts. Attractive SILP adsorber materials have been developed for broadband gas removal. All examples indicate that SILP derived catalysts and adsorbents may become a promising alternative to conventional heterogeneous systems.

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