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Activation of "Insoluble" Starting Materials for the Synthesis of Inorganic Materials in Ionic Liquids

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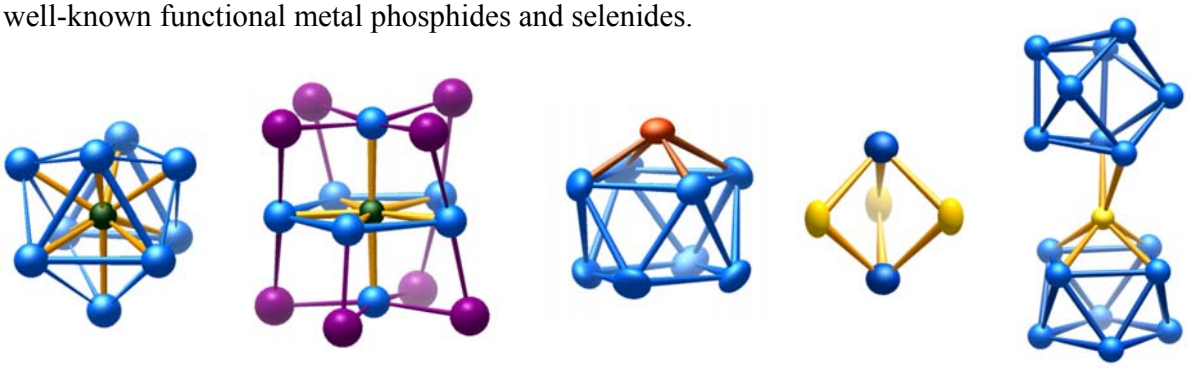
Ionic liquids (ILs) can be used for the resource-efficient synthesis of a large variety of inorganic compounds at temperatures between 20 and 200 °C.[1,2] Typically, these reactions are much faster and yield purer products than conventional high-temperature routes. Numerous parameters allow to control and direct the reaction. Remarkably, starting materials that on one hand need high activation energies in temperature-activated reactions and on the other hand are insoluble in common solvents can be used in ILs. Among them are elements, such as red phosphorus,[3] grey selenium,[4] rhodium,[5] copper[6] or gold,[7] and compounds, such as bismuth sulfide.[8] For phosphorus, selenium and copper, the mechanisms have been investigated by liquid and solid-state NMR as well as electron microscopy. The products range from unconventional clusters (see figure) to well-known functional metal phosphides and selenides.



$[RhBi_9]^{4+}$ $[(RhBi_7)I_8]$ $[CuBi_8]^{3+}$ Bi_2S_3 $[Au(Bi_8)_2]^{5+}$

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