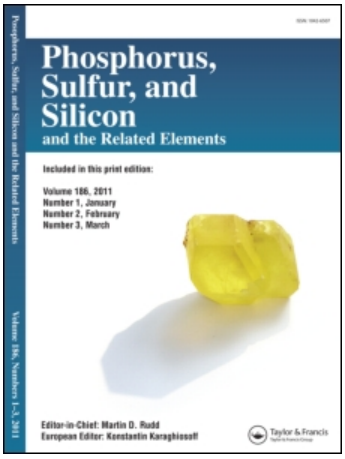

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POLYHEDRAL METALLOPHOSPHONATES AND -SILICATES: SYNTHESIS, FUNCTIONALIZATION, AND TRANSFORMATIONS

Jiri Pinkas,[a] *Zuzana Brlejova,*[a] *Jan Kratochvil,*[a] *Zdenek Moravec,*[a] *and Herbert W. Roesky*[b]
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We synthesized molecular cyclic and polyhedral precursors to aluminophosphate and silicate materials and studied their substitution and nonhydrolytic sol-gel reactions.

Keywords: Aluminum; phosphonates; siloxanes; silsesquioxanes; nonhydrolytic; sol-gel

Molecular polyhedral metallophosphonates and metallosilicates are currently intensively studied as models for the building blocks of three-dimensional structures of various solid zeolitic materials. Furthermore they serve as useful benchmarks for spectroscopic studies of prenucleation building units found in the reaction mixtures during the zeolite synthesis and as useful precursors for the preparation of organic-inorganic hybrid materials and mixed-oxide ceramics.

The aim of our studies is to synthesize new molecular building blocks, such as 4R and D4R, from metal alkyls, alkoxides, halides and amides, and phosphonic and phosphinic acids and silanetriols. We prepared several new derivatives, and characterized them by spectroscopic and structural methods. We also carried out substitution reactions at the vertices of these polygonal and polyhedral molecules that allow us to place reactive functional groups at the corners for further crosslinking. The other emphasis of our work is on finding suitable solution

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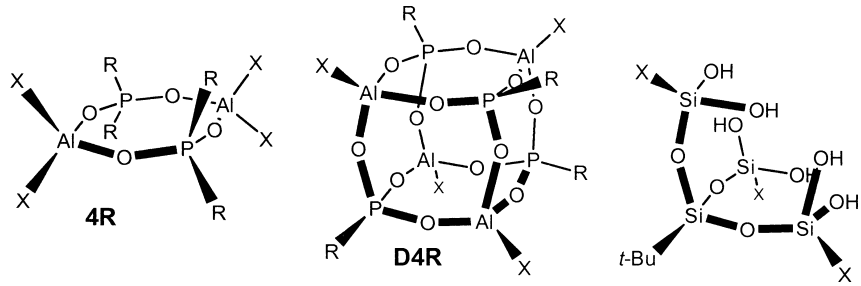

or thermal methods to convert these molecular precursors to solid materials. In this direction, nonhydrolytic reactions of the 4R derivatives were studied and we obtained amorphous aluminophosphate materials.