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Methods to Synthesize Stannosilicate Materials with Controlled Tin Coordination

A novel liquid phase reflux method precisely controls tin distribution and achieves up to four times higher tin density in stannosilicates for highly tunable catalyst, ion-exchange, and adsorption applications across the chemical and petrochemical industries.

Zeolites are a type of crystalline, microporous, silica-based structure with the ability to trap and contain individual atoms or ions. They often contain some fraction of their structural silicon atoms substituted for another atom; one of the most intriguing being tin. Tin containing zeolites known as stannosilicates, have a multitude of applications; however, they can be difficult to synthesize and produce unwanted byproducts of reaction.

Researchers at Purdue University have developed a method to synthesize stannosilicates with precisely controlled tin distributions and coordination. This is possible through the use of a liquid phase reflux to graft tin atoms into vacancies in the zeolite lattice. This method makes it possible to prepare tin zeolites with a wide range of tin content and densities up to four times higher than currently available synthesis routes. These carefully developed stannosilicates can be finely tuned to be used as a catalyst in a specific reaction, in ion-exchange, or adsorption applications.

Advantages:

-Permits precise preparation of tin zeolites

-Highest possible tin density

-Can be integrated into existing systems

Potential Applications:

-Effective catalyst in many chemical reactions

-Can be used in sugar isomerizations

-Used in ion-exchange or chemical adsorption

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Materials Science & Nanotechnology/Nanomaterials & Nanostructures

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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