Title: Titanium Dioxide Functionalized Silicon Carbide Phases as Heterogeneous Hpoxidation Catalysts

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Abstract:

Silicon carbide (SiC) is a material of choice in many fields for its thermal, mechanical and chemical resistance. In this study, SiC was selected both as the material for a catalytic exchanger-reactor and as a catalyst support. This choice was guided by the physical properties of SiC, in particular its thermal conductivity. The combined action of a catalytic support and a SiC reactor-exchanger would enable better heat diffusion, which could reduce the formation of hot spots within the reaction medium and thus prevent the onset of thermal runaway phenomena in highly exothermic processes. Ultimately, this could prevent the formation of reaction by-products and thus increase selectivity. Finally, unlike glass, SiC is a more durable material, making it more suitable as a chemical reactor material.

A highly exothermic model reaction in the liquid phase was chosen: the epoxidation of cyclohexene. The epoxidation catalyst was synthesized by surface modification of commercial SiC (SiCAT, France): the surface was first oxidized to SiO2, then grafted with titanium oxide sites and finally passivated with silyl-methyl groups to facilitate the approach and adsorption of hydrogen peroxide onto the catalyst.

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In this talk, we will present our preliminary results for the implementation of this reaction in a continuous process using a SiC reactor.

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Biography:

Dr. Johan Alauzun completed his PhD in 2005, focusing on the functionalization of hybrid mesoporous silica. He subsequently pursued three postdoctoral positions: first at the Universities of Lyon and Montpellier (France), where he worked on the synthesis of mesoporous supports for catalytic applications; then at McMaster University (Canada) in the Michael A. Brook group, where he contributed to the development of antibacterial biomaterials; and finally at the University of Lyon, where he specialized in porous non-oxide ceramics. Since 2010, he has been an Associate Professor at the University of Montpellier, where his research focuses on mesoporous hybrids and oxides synthesized through non-hydrolytic sol-gel processes. He has authored 74 publications and holds four patents.