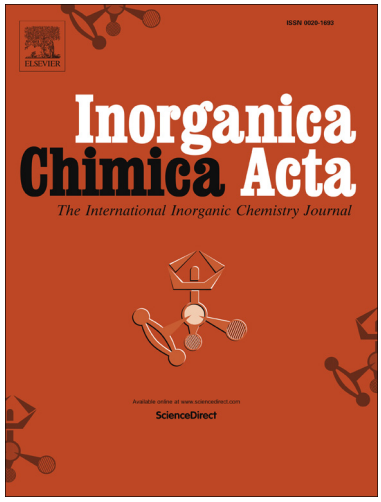

Research paper

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Titanium-Silica Catalyst derived from Defined Metallic Titanium Cluster Precursor: Synthesis and Catalytic Properties in Selective Oxidations

Claudio Evangelisti[a], Matteo Guidotti[a], Cristina Tiozzo[a], Rinaldo Psaro[a], Nataliya Maksimchuk[b,c], Irina Ivanchikova[b], Alexandr N. Shmakov[b,c,d], Oxana Kholdeeva[b,c]

a *Istituto di Scienze e Tecnologie Molecolari (CNR-ISTM), C. Golgi 19, 20133 Milano, Italy*

b *Boreskov Institute of Catalysis, Pr. Lavrentieva 5, Novosibirsk, 630090, Russia*

c *Novosibirsk State University, Pirogova 2, Novosibirsk, 630090, Russia*

d *Budker Institute of Nuclear Physics, Lavrentieva 11, Novosibirsk, 630090, Russia*

Abstract

A class of titanium-grafted mesoporous silica catalysts has been designed and prepared starting from molecularly defined metal clusters. The organosol mixture of zerovalent Ti_{13} clusters was impregnated onto the surface of ordered mesoporous silica molecular sieves (MCM-41 and MMM-2) and, after high-temperature calcination, an evenly dispersed non-single-site $Ti(IV)_nO_x$-like silica-supported catalyst was obtained. The catalytic solids, fully characterized by microscopic, spectroscopic and porosimetric techniques, showed standard performance in the liquid-phase epoxidation of a cyclic alkene, as limonene, but remarkably high selectivity values in the oxidative carboxylation of styrene, with *tert*-butylhydroperoxide and carbon dioxide in the presence of tetrabutylammonium bromide as a cocatalyst. Unprecedented high yields, up to 67%, in styrene carbonate were achieved after 24 h, under solvent-free conditions. The catalysts displayed also a noteworthy stability of the performance to repeated recovery and reuse cycles.

dedicated to Dr. Carlo Mealli