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3.1. TiO<sub>2</sub>: As Support in Metal Heterogeneous Catalysis. The study of metal nanoparticle on TiO<sub>2</sub> support is important in heterogeneous catalysis due to the size and nature of the interaction of a metal nanoparticle with TiO<sub>2</sub> support [ ]. This interaction strongly influences the determination of catalytic activity and selectivity of the metal heterogeneous catalyst [ ].

1. Introduction. Nanoporous materials, such as the classical zeolites and mesoporous silica, have been intensively investigated as ideal platforms for various applications, including gas storage, chemical sensing, energy conversion, catalysis, etc , , , , . Particularly, due to the high surface area and confined pore space that can be functionalized, nanoporous materials have demonstrated ... Currently, hydrogen is primarily used in the chemical industry, but in the near future it will become a significant fuel. There are many processes for hydrogen production. Generalized Fickian Approach for Phase Separating Fluid Mixtures in Smoothed Particle Hydrodynamics