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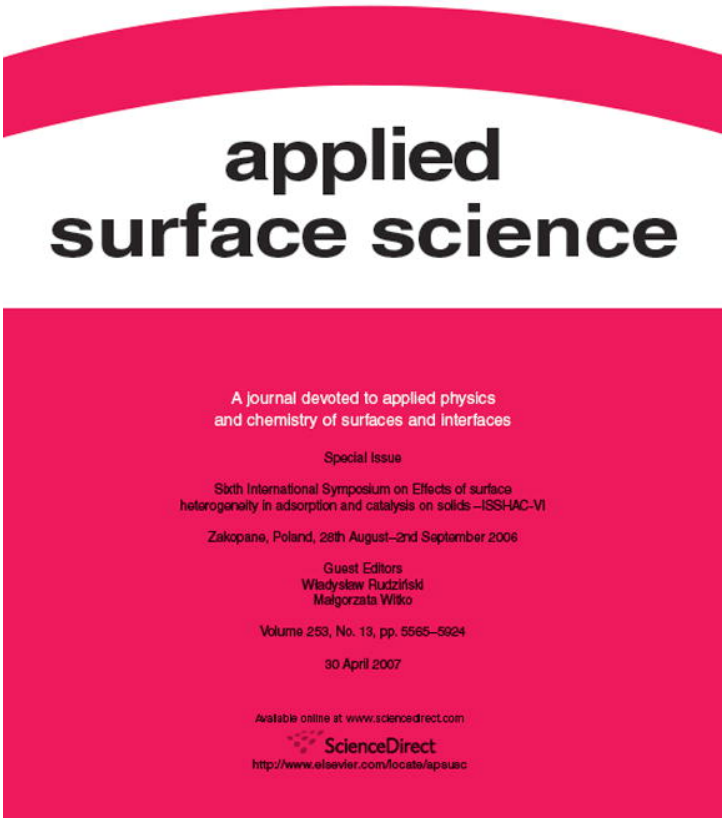

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Isothermal adsorption kinetics on heterogeneous surfaces

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Abstract

Adsorption kinetics on energetically heterogeneous surfaces under isothermal conditions is analyzed using the uniform energy distribution model. Considering the quasi-equilibrium of surface diffusion between the adsorption sites with different energy, the kinetic equations $d\Theta/dt = (k_a p - A_d K_{diff})(1-\Theta)$ for first-order adsorption and $d\Theta/dt = k_a p(1-\Theta)^2 - A_d K_{diff}\Theta(1-\Theta)$ for dissociative adsorption are obtained, where K_{diff} is a coefficient describing the surface diffusion equilibrium, which depends on the coverage and the energy distribution. Under isochoric conditions with p decreasing due to adsorption, surface diffusion accelerates the rate towards equilibrium significantly, as observed in static calorimetric adsorption experiments. An approximate solution in Lagergren form is derived for this condition.

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