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Presentation
on
The Random Corrugated Pore Structure Model for the Characterization of Porous Materials

Summary

The Random Corrugated Pore Structure Model (CPSM) is the development of a unified theory of capillary phenomena encountered in gas sorption and mercury intrusion at elevated pressures. It enables reliable surface area and pore size distributions predictions from macro- to micro-pore sizes and generates pore tortuosity and catalyst deactivation data. Model development includes a probabilistic approach based on a simplified corrugated pore configuration resulted by modifying the conventional 'bundle of cylindrical pores distributed in size'. A new pore structure parameter Ns is introduced considered to represent a nominal pore length or a frequency of pore cross section area variation. The fundamental phenomena and especially hysteresis are described by purely analytical expressions that exploit established principles i.e. the Kelvin equation for capillary phase transition, the Halsey correlation for the adsorbed gas layer thickness and Washburn equation for mercury intrusion. These relations are modified accordingly for pore networking and metastability interactions. The CPSM-Rigid Spheres variant evaluates true surface areas by taking account of pore curvature and reduced values, equivalent to BET areas, if curvature is ignored. Numerous theoretical and experimental applications have been published in research journals. Research work is under way aimed at further developing the CPSM optimization computer software involving both methods of pore structure characterization to ensure a reliable, user friendly performance for widespread applications.