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Quantifying surface areas of clays by atomic force microscopy

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ABSTRACT

Rapid and accurate determination of the surface area of three kaolinite clay standards, taking into account the complex microtopography of the particles, was achieved using atomic force microscopy images and computerized image analysis. All surface areas were determined to within 3%. Edge surface area is 18.2–30.0% of the total surface area depending on the particular kaolinite standard. Specific surface areas agree to within 4% of published values determined by the BET method. The approach can be applied to clay and nanoparticle samples too small in quantity for BET analysis, since it requires ~11 orders of magnitude less material.