

Oxidation of {100} and {111} surfaces of pyrite: Effects of preparation method

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ABSTRACT

Photoelectron spectroscopy was used to investigate the surface structure and reactivity of two pyrite {100} surfaces, prepared by different means. Specifically, synchrotron-based S 2p photoemission data for a {100} pyrite growth surface prepared by exposure to HCl, and one resulting from mechanical fracture suggested that the acid-washed growth surface showed a higher concentration of elemental sulfur and/or polysulfide impurities. The surfaces, however, showed a similar initial oxidation reactivity under a well-controlled H₂O/O₂ gaseous environment, implying that the fraction of both surfaces that underwent the initial oxidation reaction were similar in structure. The amount of initial oxidation on these surfaces, however, was significantly lower than on an acid-washed {111} growth surface. Photoelectron and ion scattering spectroscopy offer some possible reasons for this structure sensitivity.