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Dependence of the Anisotropy of Wet Chemical Etching of Silicon on the Amount of Surface Coverage by OH Radicals

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The dependence of the etch rates of different crystallographic orientations on the surface coverage by OH radicals is studied by atomistic simulations using a cellular automaton. We show that the etch rate is a non-monotonic function of OH coverage and that there always exists a coverage value at which the etch rate reaches a maximum. The dependence of the anisotropy of the etching process on coverage, including the dependence of the fastest-etched plane orientation, is implicitly contained in the model, and predictions of convex-corner under-etching structures are made. We show that the entire etching process, including the interplay between step propagation and etch pitting at any surface orientation, is controlled by only a few surface configurations involving a particular type of next-nearest neighbours.