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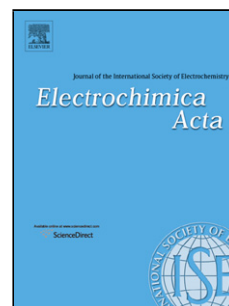
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**Role of catalyst concentration
on metal assisted chemical etching of silicon**

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Abstract

A catalyst activates the etch solution in metal assisted chemical etching e.g. of crystalline silicon in aqueous etch solutions containing hydrofluoric acid and nitric acid. This work shows for the first time that the catalyst surface concentration determines the metal assisted etch process: The amount of electroless deposited palladium clusters on the silicon surface controls the etch rate, etch regime and resulting surface morphology independent of etch solution composition. Increasing palladium concentrations change the resulting surface morphology stepwise from macro-structured through macro- and nano-porous to polished, whereas catalyst-less etches result in polished surfaces. We adapt the well-known model of electro-chemical etching to explain the catalyst influence on silicon dissolution and show a clear analogy between catalyst concentration in metal assisted etching and current density in electrochemical etching.

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