A simulation system for diffusive oxidation of silicon: A two-dimensional finite element approach

Abstract:
A numerical approach to the simulation of two-dimensional local oxidation of silicon is presented. The key idea is the description of the oxidation as a three-component thermodynamic process involving silicon, silicon dioxide, and oxidant molecules. This results in a reactive layer of finite width, in contrast to the sharp interface between silicon and dioxide in the conventional formulation. The numerical approximation takes advantage of this description in a finite-element approach which models silicon, dioxide, and reactive layer as a whole, removing the necessity of tracking the interface with element edges. It is shown that a suitable parameter identification results in an interface motion equivalent to that of the Deal-Grove model. Numerical examples show the advantages of the approach.

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