Coupled system of PDEs to Predict the Sensitivity of Some Materials Constituents of FOUP With the AMCs Cross-Contamination

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Résumé

Nowadays, with the increasing of the wafer's size and the decreasing of critical size of integrated circuit manufacturing in modern high-tech, microelectronics industry needs a maximum attention to challenge the contamination control. The move to 300 [mm] is accompanied by the use of Front Opening Unified Pods for wafer and his storage. In these pods an airborne cross contamination may occur between wafers and the pods. This work investigates the required numerical tools which are employed in order to study the AMCs cross-contamination transfer phenomena between wafers and FOUPs. A predictive model using modeling and computational methods to investigate the sensitivity of some materials constituents of the FOUP with the AMCs cross contamination were developed. Numerical optimization and finite element formulation in transient analysis were established. The behavior of the AMCs intransient analysis was determined. The model framework preserves the classical forms of the diffusion and convection-diffusion equations and yields to consistent form of the Fick's law. The adsorption process and the surface roughness effect were also traduced as a boundary condition using the switch condition Dirichlet to Neumann and the interface condition. The methodology is applied, first using the optimization methods with analytical solution to define physical constants, and second using finite element method including adsorption kinetic and the switch of Dirichlet to Neumann condition.

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