Dopant Segregation in Conventional Czochralski-Grown Silicon Single Crystals

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The growth of silicon single crystals and other electronic semiconductor materials is the basis for microelectronics industry and most of the crystalline silicon used today is produced by melt growth process. Much attention has been paid to the control of axial specific resistivity distributions in bulk crystal growth, including the use of continuous process.

Transient two-dimensional convection-diffusion model has been developed to study the transport phenomena in silicon single crystal growth by conventional Czochralski process. Numerical simulations have been performed using finite element method and implicit Euler time integration. In this work, it has been demonstrated with mathematical model and numerical analysis that the axial specific resistivity distribution can be modified and relatively uniform its profile is possible using simple proposed method.