

Abstract Submitted
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Theory of Current Crowding Effect on Electromigration

LINGYUN ZHANG, KING-NING TU, University of California, Los Angeles — We investigate the current crowding in the inhomogeneous area and explore the mechanism of gradient force in electromigration. The inhomogeneous field, which is stimulated by the inhomogeneous current density, can provide a force for the vacancies. It is shown that the magnitude of the force along the normal direction of current density is the same order as the electric field force. By using the self-consistent approach, the distribution of electrons and vacancies, and the current density distribution can be obtained. The detailed calculation demonstrates that the current density gradient is a driving force and induces the atomic rearrangement in the inhomogeneous area, which explain why the void can be formed in the low current density regions of an interconnect. Furthermore, the quantum mechanical approach is developed to understand the nature of gradient force in electromigration.

Lingyun Zhang
University of California, Los Angeles

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