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# Effect of passivation on suppression or utilization of atomic migration phenomena in metallic thin-film materials

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Characteristic phenomena of atomic migration in metallic thin-film materials affected by passivation are discussed. Two types of migration are treated. One is electromigration (EM) which is atomic diffusion owing to electron flow in high density, and another is stress migration (SM) where atoms are moved by gradient of hydrostatic stress. First as the basis, accumulation and depletion of atoms caused by EM at the interface of dissimilar metals in a straight thin-film line without passivation are reviewed. Then atomic density distribution formed by EM in a straight line with passivation is explained, and appearance of threshold current density for EM damages of hillocks and voids caused by the distribution is shown. The above discussion is also extended to a corner part composed of dissimilar metals in comparison of both cases without or with passivation. In addition to the above subject concerning EM damages, utilization of EM for fabricating micro wires or hillocks is explained. In the fabrication of micro materials, a hole is introduced in the passivation and atoms moved by EM are discharged through the hole to form a micro material. Furthermore, regarding fabrication of micro and nano materials, SM with passivation which is artificial or oxide film is finally discussed. In summary, it is stated that passivation is a key factor for controlling migration phenomena.

## Biography

M Saka received his Bachelor of Engineering degree in 1977 and his Doctor of Engineering degree in Mechanical Engineering in 1982, both from Tohoku University, Sendai, Japan. He became a Professor at Tohoku University in 1993. His research interests lie in the evaluation of material systems and the fabrication of metallic micro- and nano-materials. He is the Editor of a book entitled *"Metallic Micro and Nano Materials"*.

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