Réunions scientifiques

Séminaires

Séminaire SOLEIL

TEM and XAFS analysis of a diffusion barrier layer for advanced LSI application

Pr. Junichi KOIKE

(Department of Material Science, Tohoku University, Japan)

Invité par James ABLETT

Lundi 12 décembre à 11h00
Grand Amphi SOLEIL

Performance and reliability of advanced LSI interconnections are limited by the properties of a diffusion barrier layer. Tantalum is a typical barrier material because it is non-reactive with conducting Cu and insulating SiO2. The conventional metallic barrier layer requires a minimum thickness of several nm to ensure the diffusion barrier property, which is too thick for future LSIs. Alternatively, we propose a new method and material to form a thin (< 2nm) barrier layer by using a field-induced interface reaction between an alloying element in Cu and a SiO2 insulating layer.

In the seminar, I discuss metallurgical principles to choose a right alloying element and physical principles to control the growth behavior of the barrier layer. We employed a CVD technique to form a Mn oxide layer on various insulating substrates. Its structure and chemistry were investigated by TEM-EELS with a 0.5 nm electron probe and by XAFS with a synchrotron X-ray source. The obtained results were discussed to understand the formation mechanisms and diffusion barrier properties of the Mn oxide layer. (In the spring of 2011, the new material and method have been implemented into mass production of 32-nm LSI by IBM and its alliances.)

(1) J. Koike et al., J. Appl. Phys. 102, 043527 (2007)
(2) Y. Otsuka et al., Appl. Phys. Lett. 96, 012101 (2010)
(3) N. M. Phuong et al., J. Phys. Chem. C 115, 16731 (2011)

Formalités d'entrée *: accès libre dans l'amphi du Pavillon d'Accueil. Si la manifestation a lieu dans le Grand Amphi Soleil du Bâtiment Central, merci de vous munir d'une pièce d'identité (à échanger à l'accueil contre un badge d'accès).*

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Division Expériences - L'Orme des merisiers - Saint-Aubin - BP 48 – 91192 GIF S/YVETTE Cedex
http://www.synchrotron-soleil.fr/portal/page/portal/Soleil/ToutesActualites
Secrétariat Division Expériences : sandrine.vasseur@synchrotron-soleil.fr