



Laboratoire d'Excellence MATISSE  
« Matériaux, Interfaces, Surfaces, Environnement »

## SEMINAIRE

Lundi 27 Mai 2013 à 15h

Campus Jussieu - Salle de conférences de l'IMPMC (23-22, 4ème étage)

-----

### Dielectric Materials Research for Advanced Microelectronic Devices

**Prof. Dr. Géraud Dubois**

Hybrid Polymeric Materials Group, IBM Almaden Research Center, USA  
Department of Materials Science and Engineering, Stanford University, USA  
gdubois@us.ibm.com

Integration of porous low dielectric constant materials constitutes a major roadblock in the reliable manufacturing of back end of the line (BEOL) wiring for advanced microprocessors [1]. The two main issues for Ultra low-k (ULK) materials are their low mechanical properties and high sensitivity to plasma induced damage (PID). We have developed a new class of bridged oxycarbosilane (OCS) type materials with unique stiffness [2-4], and a novel process to enable their integration [5,6]. The Post Porosity Plasma Protection (P4) consists of refilling the pores of the fully cured porous ULK with an organic material prior to patterning, integrating the protected ULK and thermally removing the filler at the end of the process. We demonstrate the enormous potential of our integrated solution (materials at  $k < 2.4$  and P4 process) on blanket films and its compatibility with integration.

1. W. Volksen, R. D. Miller, G. Dubois, Chem. Rev. 2010, 110, 56-110.
2. G. Dubois, W. Volksen, T. Magbitang, R. D. Miller, D. M. Gage, R. H. Dauskardt, Adv. Mater. 2007, 19, 3989-94.
3. G. Dubois, W. Volksen, T. Magbitang, M. H. Sherwood, R. D. Miller, D. M. Gage, R. H. Dauskardt, J. Sol-Gel Sci. Technol. 2008, 48, 187-93.
4. M. S. Oliver, G. Dubois, M. Sherwood, D. M. Gage, R. H. Dauskardt, Adv. Funct. Mater. 2010, 20, 2884-92.
5. T. Frot, W. Volksen, S. Purushothaman, R. Bruce, G. Dubois, Adv. Mater. 2011, 23, 2828-32.
6. T. Frot, W. Volksen, S. Purushothaman, R. Bruce, T. Magbitang, D. C. Miller, V. R. Deline, G. Dubois, Adv. Funct. Mater. 2012, 22, 3043-3050.