Imprintable low-k dielectric materials

The Laboratoire des Technologies de la Microelectronique has been working since the last decade on the development of Nano Imprint Lithography (NIL). Thanks to its high potential in terms of throughput, alignment capability and high resolution, UV curing NanoImprint Lithography (UV-NIL) is nowadays considered as a promising next generation lithography technique and has been placed on the ITRS roadmap as a possible candidate for the 32nm node device fabrication.

Compared to projection lithography techniques, nanoimprint can offer two specific advantages: the possibility to print directly in the functional material and the ability to replicate three-dimensional (3D) structures. Considering these two properties, the most promising application is the development of the dual damascene process (fabrication of the copper interconnects in Back End Of Line (BEOL) processes in the CMOS technology) via direct imprinting of a functional low-k UV-curable material using an imprint template with two levels of patterning (one for the vias, the second one for the channels). Consequently, the full process requires half as many steps as standard dual damascene techniques.

For the time being, only very few world wide research institutes have reported the feasibility of 3D imprinting in photocurable low-k dielectrics and there are still a lot of improvements to be done concerning those materials. The main properties needed for these materials are: a low viscosity before curing, a low dielectric constant, a high resistance to plasma etching, a high mechanical stability as well as a low shrinkage during curing.

The open post-doc position aims to address the development of these low-k UV-curable imprint materials. Research activities on those topics are conducted using a UV-NIL stepper made by Electron Vision Group and the technological infrastructure of the CEA-LETI.

The candidate should have competences in the domain of polymers dedicated to microelectronics applications. He (she) has a PhD degree in Chemistry, Material science, Physics, Microelectronics.

Availability of the position: 1st October 2006
Contact person: Dr Marc Zelsmann, marc.zelsmann@cea.fr, phone: +33 (0)4 38 78 92 92
Contact type: CDD (limited duration contract: 2 years)
Net salary: 1870 € /month