Cleaning: Once Again, the Challenges Continues

The continuing down-scaling of device geometries in the semiconductor industry is driving the requirements for both process and contamination control beyond limits ever envisioned as being possible to overcome. Historically, the physical and the chemical processes required for contamination control were evolutionarily scaled with device geometry. However, today's tailored wet-chemical cleaning approaches must strive to meet stringent requirements to assure zero-material loss and zero induced-damage to extremely fragile structures. While chemical solutions exist for the control of molecular-organic and metallic ion contamination, the physico-chemical solutions for the removal of nano-sized particulate contamination to critical diameters below 20 nm are still undetermined. The potential and the limitations of megasonic and aerosol cleaning are carefully balanced and a detailed understanding of the ongoing physical mechanisms is necessary to maintain a stable window of operation. The mechanisms present in a megasonic cleaning process, such as streaming and bubble activity, will depend in great part on the characteristics of the applied sound field; that is to say on frequency, amplitude and uniformity. Different techniques and simulations have been developed over the last year to improve the understanding and the design of a novel cleaning tool that can address the challenges of damage-free features and reduced substrate loss.

Biography:
Frank Holsteyns: earned his Masters and continues his doctoral studies as chemical engineer (interphase chemistry) at the Catholic university of Leuven (Belgium). Has 6 years of working experience (2000-2006) as researcher at IMEC in Leuven (Belgium); working for the Ultra Clean Processing group of Paul Mertens on nano-particle removal from semiconductor substrates by using Megasonic cleaning and the development of semiconductor substrate inspection techniques. Joined SEZ as researcher in 2006 and is integrated in the group developing novel cleans for nano-particle removal.