

Ultra-thin solar blind EUV imager reported by Imec

December 8 2010

Yesterday at the International Electron Devices Meeting in San Francisco imec presents an ultra-thin hybrid AlGa_N-on-Si-based extreme ultraviolet (EUV) imager with only 10 μ m pixel-to-pixel pitch. The wide-bandgap material (AlGa_N) provides insensitivity to visible wavelengths and enhanced UV radiation hardness compared to silicon. Backside illumination in a hybrid design was used to achieve a very small pitch-to-pitch (10 μ m only). The novel imager shows an excellent detection down to a wavelength of 1nm.

Ultraviolet detection is of particular interest for solar science, EUV microscopy and advanced EUV lithography tools. Sensors using wide-bandgap materials overcome the drawbacks of Si-based sensors such as their sensitivity to UV radiation damage and the need for filters to block the unnecessary visible and infrared radiation.

[Imec](#)'s backside illuminated EUV imager is based on a state-of-the-art hybrid design integrating an AlGa_N sensor on a silicon readout chip. A submicron thick AlGa_N layer was grown on a Si(111) wafer using molecular beam epitaxy and a focal plane array of 256x256 pixels with a pixel-to-pixel pitch of 10 micron was processed. Each pixel contains a Schottky diode optimized for backside illumination.

A custom read-out chip, based on capacitance transimpedance amplifiers, was fabricated in 0.35 μ m CMOS technology. The AlGa_N wafer and read-out chip were post-processed with indium solder bumps with 10 μ m pixel-to-pixel pitch achieving excellent uniformity. The focal

plane array and read-out chip were assembled using flip-chip bonding and subsequently the silicon substrate was locally removed to enable backside illumination of the active AlGaIn layer. Finally, the imager was packaged and wire-bonded. Measurements demonstrated an excellent response down to a wavelength of 1nm.

These results were obtained in collaboration with CRHEA/CNRS (France) and the Royal Observatory of Belgium in the framework of the BOLD project of the European Space Agency (ESA).

Source: IMEC

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