

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 AlGaN-on-Si-based extreme ultraviolet (EUV) imager with only 10µm pixel-to-pixel pitch. The wide-bandgap material (AlGaN) 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 (10µm 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 widebandgap 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 AlGaN sensor on a silicon readout chip. A submicron thick AlGaN 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 0.35µm CMOS technology. The AlGaN wafer and read-out chip were post-processed with indium solder bumps with 10µm 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 AlGaN 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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