**Nanostructured front grid contacts for III-V solar cells.**

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We report on the fabrication and electrical characterization of Ge/Pd/Au nanostructured grids used as front contact for III-V concentration solar cells. The nanogrids have been patterned by electron beam lithography (EBL) while the Ge/Pd/Au trilayer has been deposited by sputtering. After a lift-off process, linewidths ranging from 80 nm to 300 nm and periods of 250 nm to 20 µm over GaAs substrates have been achieved (Figure 1, 2). Different thickness combinations of the trilayer and Rapid Thermal Annealing (RTA) conditions have been studied in order to achieve a low contact resistance ($R_c$) to the solar cell emitter layer. Values in the range of $R_c \sim 10^{-6}$ $\Omega cm^2$ have been obtained.

The use of metallic nanogrids for the management of photons and electrons inside the cell may lead to an improved performance of the solar cells [1]. But the design of the front contact grid (dimensions, shape and geometric arrangement) is not straightforward, due to the intrinsic complication related to the (series resistance)/(shadow factor) balance it implies. Moreover, it has been shown [2] that the front contact grid is a limiting factor for the maximum current density a concentration solar cell can sustain. On the other hand, the use of nanostructured metals in the surface of a semiconductor can give rise to effects such as diffraction, plasmon polariton resonances, extraordinary optical transmission, etc. [3] that can be used for light-trapping to increase the probability of carrier generation [1, 4]

**References**

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**Figures**

*Scanning Electron Micrographs of the fabricated nanogrids.*

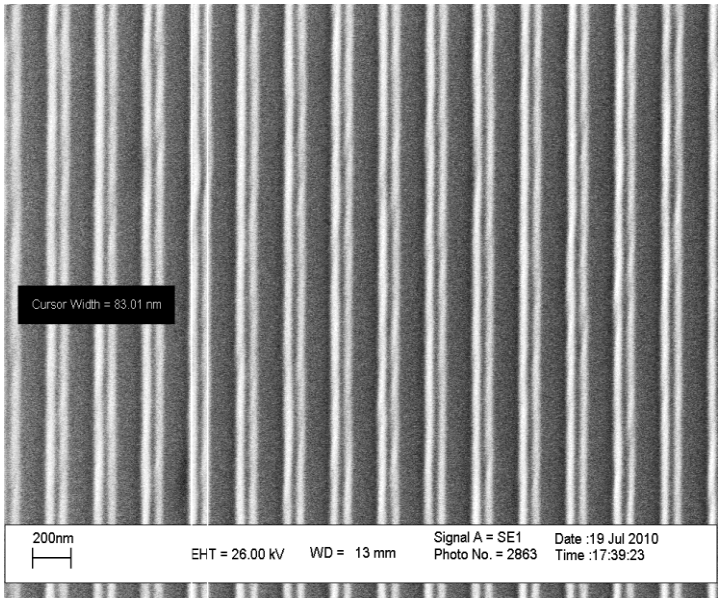


Fig. 1: SEM micrograph of a grid with 83 nm linewidth

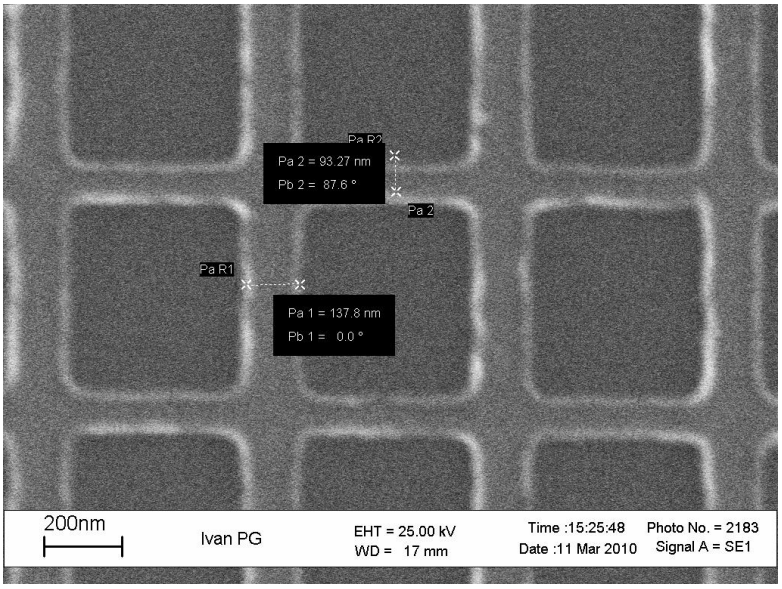


Fig. 2: SEM micrograph of a double-grid with 93 nm and 137 nm linewidth