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Nanostructuring of III-V semiconductors with *in situ* passivated surfaces

Reproducible etching of semiconducting materials with atomic level depth resolution is of high interest to the advancement of technologies addressing fabrication of low-dimensional devices, tunability of their optoelectronic properties and precise control of device surface structure. The so-called digital etching requires specialized and expensive equipment and relies on *ex situ* calibration processes. We have proposed that III-V semiconductor materials with negligible dark corrosion could be subjected to a controlled photocorrosion monitored *in situ* with the photoluminescence (PL) effect. The advantage of this approach is that photo-induced digital etching is achieved without the need of changing the environment – a procedure that, normally, is required for removing the product of a self-limiting reaction. The accumulated results indicate that the digital photocorrosion (DIP) process of GaAs/AlGaAs quantum well microstructures could be carried with sub-monolayer precision and simultaneously monitored with PL. Recently, we have demonstrated that DIP could also be monitored with open circuit potential (OCP) measured between the photocorroding semiconductor surface and an Ag/AgCl reference electrode installed in the sample chamber. The excellent correlation between the position of both PL and OCP maxima that reveal the location of GaAs-AlGaAs interfaces, indicates that the DPC process could be monitored *in situ* for materials that do not exhibit measurable PL emission.

Biography

Jan J Dubowski received his PhD degree in Semiconductor Physics from the Wroclaw University of Technology, Poland. He is a Canada Research Chair and a full Professor at the Department of Electrical and Computer Engineering of the University de Sherbrooke, Canada. He is a Fellow of SPIE- The International Society for Optics and Photonics (citation: "For innovative methods of investigation of laser- matter interaction"). He has published over 200 research papers, reviews, book chapters and conference proceedings. He is an Associate Editor of the *Journal of Laser Micro/Nanoengineering*, *Biosensors and Light: Science & Applications*.

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