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Nanostructured heterolayers for biosensor and photovoltaic nanodevices: A plasma technique AMANDA RIDER, IGOR LEVCHENKO, KOSTYA (KEN) OSTRIKOV, Plasma Nanoscience, The University of Sydney — Novel structures incorporating heterolayers of buried quantum dots (QDs) have been proposed for biosensors and solar cells, in some cases there is an additional layer of unburied, surface QDs or larger nanostructured islands, the signal from which is reported to be enhanced due to correlation with the buried QDs. Such devices are particularly alluring due to the current research focus on nanobiotechnology and renewable energy. For satisfactory device performance, care must be taken to ensure a high level of control over the composition, size, morphology and positioning of these QDs, both buried and on the surface. Such considerations are crucial for, amongst other things, band-gap engineering efforts, device efficiency and biofunctionalization. The distinct advantages of the low-temperature growth afforded by plasmas are particularly notable when considering biological and photovoltaic applications. The utilization of plasma-based methods is a promising way to ensure all these requirements are met. We demonstrate through hybrid numerical simulation, the plasma-assisted fabrication of both buried and surface quantum dots with precise control over composition [1], size-uniformity [2], morphology, crystallinity and positioning. [1] A. E. Rider, J. Appl. Phys. 101, 044306 (2007); [2] A. E. Rider et al, Plasma. Process. Polym., article accepted (2007).

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