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Microplasma surface engineering of silicon nanocrystals for improved inorganic/polymer nanocomposites SOMAK MITRA, University of Ulster, VLADIMIR SVRCEK, National Institute of Advanced Industrial Science and Technology (AIST), PAUL MAGUIRE, DAVIDE MARIOTTI, University of Ulster, VLADIMIR SVRCEK COLLABORATION — Improved optoelectronic properties have been achieved by direct current (DC) microplasma-induced 3-dimesional (3D) surface engineering of silicon nanocrystals (SiNCs) in water with (Poly(3,4-ethylenedioxythiophene) poly(styrenesulfonate)) (PEDOT:PSS). Specifically, we have successfully shown that photoluminescence (PL) of SiNCs inside a water-based solution increases after microplasma processing. The experimental results show that optical properties of SiNCs do not deteriorate over time and remain stable in water with potential application impact for bio-related applications. We have also shown that fast oxidation process in water is prevented over longer period of time due to the microplasma processing in comparison to the unprocessed sample. Furthermore, the improved surface characteristics allow for the formation of water-soluble nanocomposites with improved opto-electronic properties; this can have direct implications for higher performance opto-electronic devices including solar cells.

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