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Effects of Remote Plasma Treatment on Surface Defects in ZnO Nanopowders JORGE PARAMO, RAUL PETERS, YURI STRZHEMECHNY, Texas Christian University — The field of high-tech applications of ZnO nanostructures is rapidly growing. Because of the large surface/volume ratio in these systems, device performance in many cases is determined by surface and near-surface properties of the nanocrystals. The nature of the surface/subsurface defect states in nanosized ZnO is still ambiguous, and only in a small number of recent studies attempts were made to modify these states in a controllable fashion. In our work, we used remote plasma treatment of several commercially available ZnO nanopowders to manipulate their surface and subsurface defects. Temperature-dependent photoluminescence spectroscopy was employed to monitor the effects of nitrogen, hydrogen, and oxygen plasmas on the surface states. We demonstrated that those plasma species induce a variety of changes in the deep defect visible emission as well as in the bound-exciton luminescence, most likely associated with the surface/subsurface states. We also observed significant size-dependent effects of plasma treatment in our nanosystems.

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