Abstract Submitted
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Hydrogenation of Semiconductors Using an Ultra-Violet Light Source[1] T.D. GOLDING, University of North Texas/ Amethyst Research, R. HELLMER, Amethyst Research, J. H. DINAN, U.S. Army RDECOM CERDEC NVESD, R. J. COTTIER, U. of North Texas, L. WANG, Evans Analytical Group, W. ZHAO, U. of North Texas, F. AMIR, U. of North Texas, J. HOUSE, U. of North Texas — Hydrogenation (also referred to as passivation) of semiconductors using a plasma discharge is routine. However, the process can cause unwanted modification of the surface, and requires contact masking if control of the lateral dosage is required. We will present results of a new technique for the hydrogenation of semiconductors based on the use of an ultra-violet (UV) light. While our studies have been conducted primarily on HgCdTe, we have similar results for the hydrogenation of GaAs and InP. Using the technique of secondary ion mass spectroscopy (SIMS) we have found that D is readily incorporated into semiconductors when the surface of the semiconductor is simultaneously exposed to a hydrogen (deuterium) gas and UV light. No D is observed to be present (to within the SIMS resolution) if the sample is treated under similar conditions without the UV light present. Early studies of the temperature dependence on the D concentration verses depth indicate that the process is diffusion driven. These results strongly suggest that the UV photons are dissociating adsorbed D molecules to atomic D on the semiconductor surface. In addition to our experimental results details of theoretical modeling to account for this phenomenon will be presented.

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