

Abstract Submitted  
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**$^1\text{H}$  NMR In Hydrogenated Nano-Crystalline Silicon Thin Films**

KRISTIN KIRILUK, T. SU, P.C. TAYLOR, Colorado School of Mines, B. YAN, J. YANG, S. GUHA, United Solar Ovonic — Hydrogenated nano-crystalline silicon (nc-Si:H) thin films is a promising material for multi-junction solar cells. We investigated the local hydrogen environments in nano-crystalline silicon thin films by nuclear-magnetic-resonance. At room temperature,  $^1\text{H}$  NMR shows a much higher degree of hydrogen clustering than observed in typical a-Si:H, these hydrogen atoms are probably located at the grain boundaries of the nano-crystallites. As the temperature decreases, the  $^1\text{H}$  NMR shows a broadening of the lineshape of the nc-Si:H. These results suggest that the local hydrogen order in nc-Si:H is very different from that in a-Si:H, and this local order may be responsible for certain unique optoelectronic properties of nc-Si:H thin films. The dependence of the spin lattice relaxation time on temperature, however, is very similar to that of a-Si:H. This suggests that even though the local hydrogen order may be different, there is still molecular hydrogen present in nc-Si:H that relaxes the bonded hydrogen.

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