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Plasma Modeling of Microcrystalline Silicon Thin Film Deposition Process ELEFTHERIOS AMANATIDES, SPYRIDON SFIKAS, DIMITRIOS MATARAS, Plasma Technology Lab., Dpt. of Chem. Engineering, University of Patras , AUREL SALABAS, OC Oerlikon Solar, Trubbach, Switzerland CH-9477, PLASMA TECHNOLOGY LAB., DPT. OF CHEM. ENGINEERING, UNIVERSITY OF PATRAS TEAM, OC OERLIKON SOLAR, TRUBBACH, SWITZERLAND CH-9477 COLLABORATION — PECVD of thin films from SiH_4-H_2 discharges is a widely used technique for deposition of hydrogenated amorphous as well as microcrystalline silicon. All plasma parameters strongly affect the plasma chemistry, the characteristics and quality of the deposited films. A well tuned discharge model can serve as a reliable laboratory tool. We present a model for PECVD of mc-Si:H, using a self consistent fluid approach. All simulations were performed in CCP discharge sustained at 40.68 MHz. Process conditions have been chosen so that the obtained films are close to the a-Si:H to mc-Si:H transition. The geometry corresponds to a bench chamber similar with plasma reactors used for solar panel manufacturing. The effect of plasma power on the deposition process was investigated; the other plasma parameters were kept constant. The contribution of precursor fluxes to the film growth rate is discussed in the context of film thickness uniformity. The main reasons that favor the growth of mc-Si:H instead of a-Si:H under relatively high power conditions are also analyzed.

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