

INVESTIGATION OF SILICON NITRIDE COATING DEPOSITED BY PECVD FOR SOLAR CELL FRONT SIDE PASSIVATION

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ABSTRACT. Plasma Enhanced Chemical Vapor Deposition (PECVD) silicon nitride ($\text{SiN}_x\text{:H}$, simply called SiN_x) has been widely used in photovoltaic silicon solar cells as dielectric, because of low deposited temperature and compatibility with other process. SiN_x gradually becomes the first choice in industry silicon solar cells production. Nowadays, in photovoltaic silicon solar cells, the excellent antireflection and passivation quality of PECVD SiN_x have obvious effect on efficiency of solar cells. In this paper, we analysis several critical parameters for PECVD SiN_x deposition, such as temperature of substrate, plasma power, ratio of NH_3/SiH_4 and deposition time, and to investigate optical properties such as weighted reflectance (R_w), ellipsometry measurement for SiN_x thin film refractive indices and thickness, then we investigate the correlation between the ratio $R=[\text{NH}_3/\text{SiH}_4]$ and plasma power with refractive indices and deposition rate. At last, we propose a set of optimized parameters for PECVD- SiN_x deposition in silicon solar cells application.

KEYWORDS: *SiN_x , PECVD, passivation, antireflection coating.*