[IV-10]

Effect of SiF_4 addition on the structures of silicon films deposited at low temperature by remote plasma enhanced chemical vapor deposition

Xiaodong Li[*,**], Young-Bae Park[*], Dong-Hwan Kim[*] and Shi-Woo Rhee[*]

[*] *Laboratory for Advanced Materials Processing (LAMP), Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), San 31 Hyoja Dong, Pohang, Kyungbuk, 790-784, Republic of Korea*

[**] *Department of Metals and Technology, Harbin Institute of Technology, Harbin 50001, P.R. China*

ABSTRACT

Silicon films were deposited at 430℃ by remote plasma chemical vapor deposition (RPECVD) with a gas mixture of $Si_2H_6/SiF_4/H_2$. The silicon films deposited without and with SiF_4 were characterized using atomic force microscopy (AFM), transmission electron microscopy (TEM) and X-ray diffraction (XRD). Both silicon films have the same rugged surface morphology, but, the silicon film deposited with SiF_4 exhibits more rugged. The silicon film deposited without SiF_4 is amorphous, whereas the silicon film deposited with SiF_4 is polycrystallline with very mall need-like grains which are perpendicular to the substrate and uniformly distributed in the thickness of the film. The silicon film deposited with SiF_4 was found to have a preferred orientation along the growth direction with the <110> of the film parallel to the <111> of the substrate. The effect of SiF_4 during RPECVD was discussed.