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Low Temperature Deposition of PECVD Polycrystalline Silicon Thin Films using SiF4 / SiH4 mixture MONIRUZZAMAN SYED, Lemoyne Owen College, TAKAO INOKUMA, YOSHIHIRO KURATA, SEIICHI HASEGAWA, Kanazawa University — Polycrystalline silicon films with a strong (110) texture were prepared at 400C by a plasma-enhanced chemical vapor deposition using different SiF4 flow rates ([SiF4] = 0–0.5 sccm) under a fixed SiH4 flow rate ([SiH4] = 1 or 0.15 sccm). The effects of the addition of SiF4 to SiH4 on the structural properties of the films were studied by Raman scattering, X-ray diffraction (XRD), Atomic force microscopy and stress measurements. For [SiH4] = 1 sccm, the crystallinity and the (110) XRD grain size monotonically increased with increasing [SiF4] and their respective maxima reach 90% and 900 Å. However, for [SiH4] = 0.15 sccm, both the crystallinity and the grain size decreased with [SiF4]. Mechanisms causing the change in crystallinity are discussed, and it was suggested that an improvement in the crystallinity, due to the addition of SiF4, is likely to be caused by the effect of a change in the surface morphology of the substrates along with the effect of in situ chemical cleaning.

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