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DIAMONDLIKE CARBON THIN FILM DEPOSITION
USING A RF PLANAR COIL
INDUCTIVELY COUPLED PLASMA SYSTEM

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Abstract

A RF planar coil inductively coupled plasma system (ICPs) is setup for this project. The system is powered by a 13.56MHz, 550W, 50Ω RF generator. The RF power is transferred to the plasma via a planar induction coil. The impedance matching circuit consists of an air-core step-down transformer and a tunable vacuum capacitor. The typical E-H mode transition which is distinctive to the ICP has been observed in argon plasma, hydrogen plasma and hydrogen-methane admixture plasma. The studies carried out include the observation of intensity of light emission from the plasma, the power transferred at different pressures, the concentration of plasma with glass funnel, the effect of methane present in hydrogen plasma and the induction heating effect. These studies are important for the application of the system for plasma enhanced chemical vapour deposition (PECVD) of diamondlike carbon (DLC) films deposited on silicon substrate. The effect of the percentage of methane, the influence of the pretreatment using diamond paste on the substrate and the induction heating effect on the DLC coating are reported.

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Abstrak

Suatu sistem plasma induksi (ICPs) gegelung satah telah dibina dalam projek ini. Sistem ini menggunakan penjana RF 13.56MHz, 550W, 50 Ω . Kuasa RF disalurkan kepada plasma melalui gegelung induksi satah. Litar peyelaras impedans yang diguna mengandungi transformer injap turun berteraskan udara dan kapasitor vakum bolehubah. Peralihan mod E-H yang khas bagi plasma induksi diperhatikan dalam plasma argon, plasma hidrogen dan campuran hidrogen dengan metana. Penyelidikan yang dijalankan termasuk pemerhatian bagi keamatan plasma, perubahan plasma bagi tekanan gas berlainan, penghimpunan plasma dengan kon gelas berlohong dan kesan pemanasan induksi. Penyelidikan-penyelidikan ini adalah penting untuk penyelidikan penyaduran "diamondlike carbon" (DLC) melalui kaedah penyaduran wap kimia secara pencergasan plasma (PECVD). Kesan daripada peratus metana berlainan, kesan daripada rawatan awalan dengan adunan intan dan kesan pemanasan induksi terhadap penyaduran DLC dikaji.

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