Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Internal Seminar

Diagnostics and nonlinear dynamics of DC magnetron sputtering plasma during thin film deposition

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Direct current magnetron sputtering system has been developed and characterised. Magnetic field (B) distribution of the magnetron has been measured using gauss meter. The plasma parameters have been estimated using electron flux (EF) and electron energy distribution function (EEDF) methods. The deposition rate (Dr) follows the same profile as that of plasma parameters. Magnetron configuration has been simulated using COMSOL Multiphysics and compared with the experimentally measured profile. Floating potential fluctuations from a direct current magnetron sputtering plasma have been analysed using time series analysis techniques like phase space plots, power spectra, frequency bifurcation plot, etc. The system exhibits quasiperiodic-chaotic-quasiperiodic-chaotic transitions as the discharge voltage was increased. The transitions of the fluctuations, quantified using the largest Lyapunov exponent, have been corroborated by Hurst exponent and the Shannon entropy. Further, the nonlinear dynamics of a direct current magnetron sputtering plasma is visualized using recurrence plot (RP) technique. RP comprises the recurrence quantification analysis (RQA) which is an efficient method to observe critical regime transitions in dynamics. Bactericidal efficiency of nanostructured Al–O/Ti–O composite thin films prepared by dual magnetron reactive co-sputtering technique. In which Mixed oxide Al-O/Ti-O composite nanostructured thin films were prepared at Ar:O_2 gas ratio 70:30 (7:3 in sccm) by reactive magnetron co-sputtering method. The effect of Al in the films on the antibacterial efficiency has been studied.

Monday, Aug 21st 2017

04:00 PM (Tea/Coffee at 03:45 PM)

Auditorium, TIFR-H (FReT-B)