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## Structural, Compositional and Morphological Characterisation of Reactive Pulsed Laser Deposited Niobium Nitride thin films

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Transition metal nitrides and carbides, especially as thin films, are promising candidates for many technical applications as they exhibit an attractive mixture of physical, chemical and mechanical properties. Niobium nitrides are of increasing interest due to its hardness, wear resistance, superconducting and sensing properties. In this study, NbN thin films were deposited using Reactive pulsed laser deposition (RPLD) technique through ablation of elemental niobium target in a nitrogen environment. Effect of nitrogen pressure in the range of 1-10 Pa is studied. GIXRD results indicated the formation of cubic NbN phase corresponding to JCPDS-381155 data with a lattice parameter of 4.40 Å. However, the film indicated varying degree of texture depending on the substrate. Proton elastic scattering studies were used to determine the composition of the films as a function of nitrogen pressure. Films deposited under 3 Pa nitrogen atmosphere are sub stoichiometric with respect to nitrogen; however there is a tendency towards formation of stoichiometric NbN films at higher nitrogen pressures. AFM was used to study the surface morphology. With increase in nitrogen pressure, a systematic increase in number of nucleation sites leading to the increase in thickness and surface roughness was revealed.

