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Effect of thickness on optical and microwave dielectric properties of Hydroxyapatite films deposited by RF magnetron sputtering

Apurba Das¹, Anil Kumar Chikkala¹, Gyan Prakash Bharti¹, Rasmi Ranjan Behera², Ravi Sankar Mamilla², Alike Khare¹ and Pamu Dobbidi^{1*}

¹*Department of Physics, Indian Institute of Technology Guwahati, Guwahati-781039, India.*

²*Department of Mechanical Engineering, Indian Institute of Technology Guwahati, Guwahati-781039, India.*

Abstract:

This study presents findings on the structural, optical and dielectric properties of polycrystalline Hydroxyapatite [HAp, $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$] films, deposited using radio-frequency (RF) magnetron sputtering. The X-ray diffraction (XRD) studies revealed that the unit cell volume and crystallite size of the films deposited on quartz substrates enhanced with an increase in film thickness. The Young's modulus (E_{hkl}) and the Poisson ratio (ν_{hkl}) of the thin films along different crystallographic directions have been calculated using the X-ray elastic constants. The Young's modulus of the films exhibited crystallographic direction dependence which suggests that the sputtered films are anisotropic. The dielectric constant ϵ_r and the loss tangent $\tan\delta$ of the sputtered films were in the range 29 - 85 and 0.0028 - 0.0014 respectively at a frequency of 1 MHz. These values are by far the best for films

* Corresponding Author: -
Tel: +91-361-2582721
Fax: +91-361-2582749
E-mail: - pamu@iitg.ernet.in

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