INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	**Apurba Das**
Roll Number	:	**166121008**
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Name of Thesis Supervisor(s)	:	**Prof. Pamu Dobbidi**
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SHORT ABSTRACT

The thesis is devoted to systematically studying Hydroxyapatite ($Ca_{10}(PO_4)_6(OH)_2$, HAP) based ceramic composites and thin films for biomedical applications. The study emphasizes the usefulness of electrical activity in augmenting the biological properties of the composites for fracture healing. We developed composites of $Ca_{10}(PO_4)_6(OH)_2 - SrTiO_3$ and $Ca_{10}(PO_4)_6(OH)_2 - Ba_{0.5}Sr_{0.5}TiO_3$ with the idea of improving the overall dielectric constant (ε_r) of the ceramic composites. We developed an understanding of the usefulness of the ε_r in dictating the biological response of the ceramic composites. The theory relates to applying electric stimulation to achieve rapid fracture healing. In fracture healing applying electric stimulations after regular intervals has become a preferred course of treatment to achieve rapid healing. When scaffolds developed from ceramics are implanted in fractured sites, they inherently undergo polarization (on the application of the external stimulations), leading to the generation of the polarized electric field. The polarized field is expected to generate the electric field at the injured site even after removing stimulations. This internal electric field may lead to an acceleration of the healing process. The magnitude of the polarized field is determined by the ε_r of the composite. Thus, tuning the ε_r can be important for generating scaffolds and thin films for implant coating. The thesis covers these aspects in detail, apart from the preliminary analysis of the biological properties such as cytocompatibility, bioactivity, and protein adsorption of the composites.