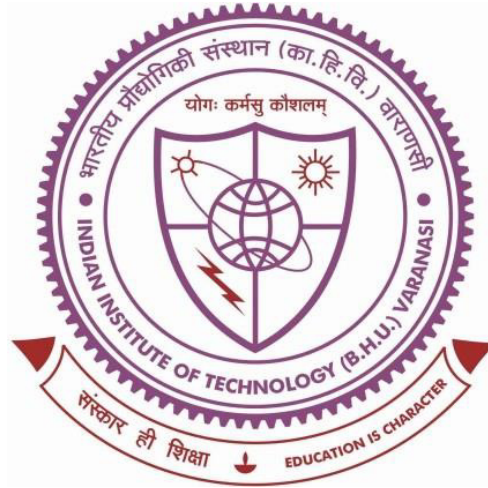


Synthesis and Characterization of Hydroxyapatite From Waste Natural Resources



Thesis submitted in partial fulfillment for the
Award of Degree
Doctor of Philosophy

By

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sliding. Profilometer and SEM were utilized to examine the depth and morphology of the wear tracks.

- ❖ The findings indicate that the synthetic composite dentures are comparable to natural dentures in terms of wettability and wear resistance.

8.2 Future Scope

After the successful accomplishment of the current objectives in the thesis, new lacunas were identified that could be listed as a future scope of the current work.

- ❖ The main aim of the current research was to transform the synthesized HAp from a **laboratory scale to a commercial scale**. i.e., strive to acquire regulatory approval for utilizing HAp generated from waste eggshells in biomedical applications and investigate opportunities for commercialization through partnerships with industry collaborators or knowledge transfer programs.
- ❖ Examine the practicality of utilizing discarded eggshell-derived hydroxyapatite (HAp) as a raw material for 3D printing of customized biomedical structures, such as scaffolds for tissue engineering or implants for bone regeneration.
- ❖ Parametric optimization based on pH, temperature, precursors, environment, etc. can be further explored and analyzed.
- ❖ Effect of other metals doping (apart from Ag⁺) can be done in hydroxyapatite and characterized for other specific applications.
- ❖ Other natural waste materials can be explored for deriving useful output.

- ❖ Examine the feasibility of integrating HAp derived from waste eggshells into composite materials comprising polymers, ceramics, or other bioactive substances (except PMMA). The objective is to develop hybrid biomaterials that exhibit improved mechanical, biological, and degradation properties.
- ❖ Synthesize and explore other methods of coating and analyze the compatibility, adhesion strength and other characteristics.
- ❖ The **computational analysis** on the synthesized HAp can be performed.