

Bioinspired Sn-Substituted Hydroxyapatite for Dental Desensitization: Structural Insights and Synthesis Optimization

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INTRODUCTION & AIM

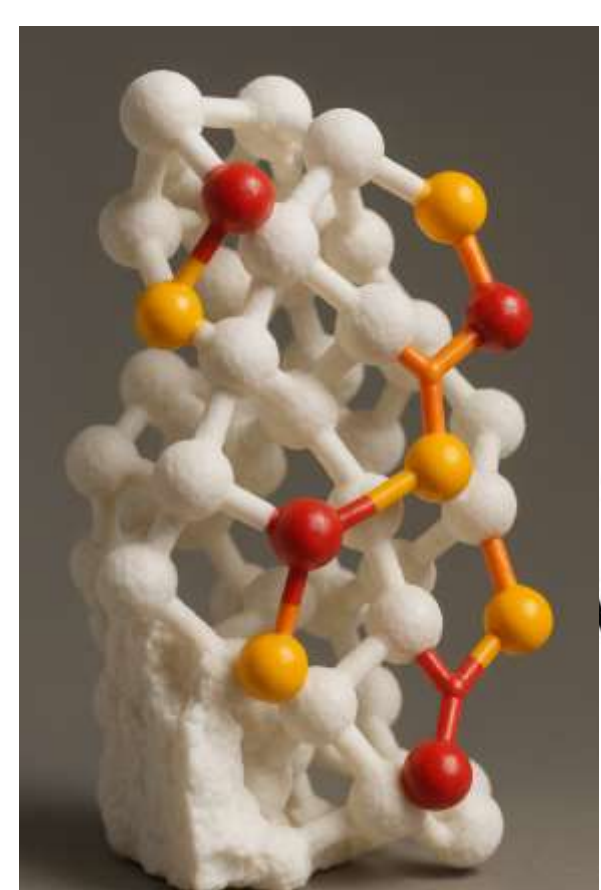


Hydroxyapatite (HAp), the primary mineral of enamel and dentin

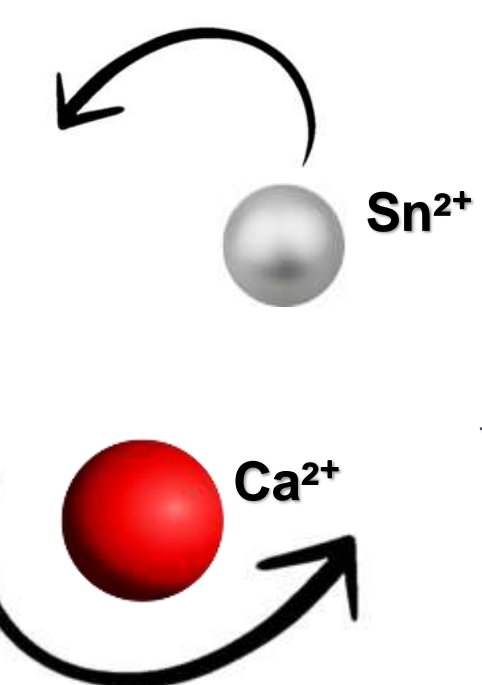
Dentin hypersensitivity affects 15–30% of adults

SnF₂-based treatments: short-term relief
Problems:
✗ chemical instability of Sn²⁺ in the oral environment
✗ poor taste
✗ limited integration with tooth structures

✓ Solution

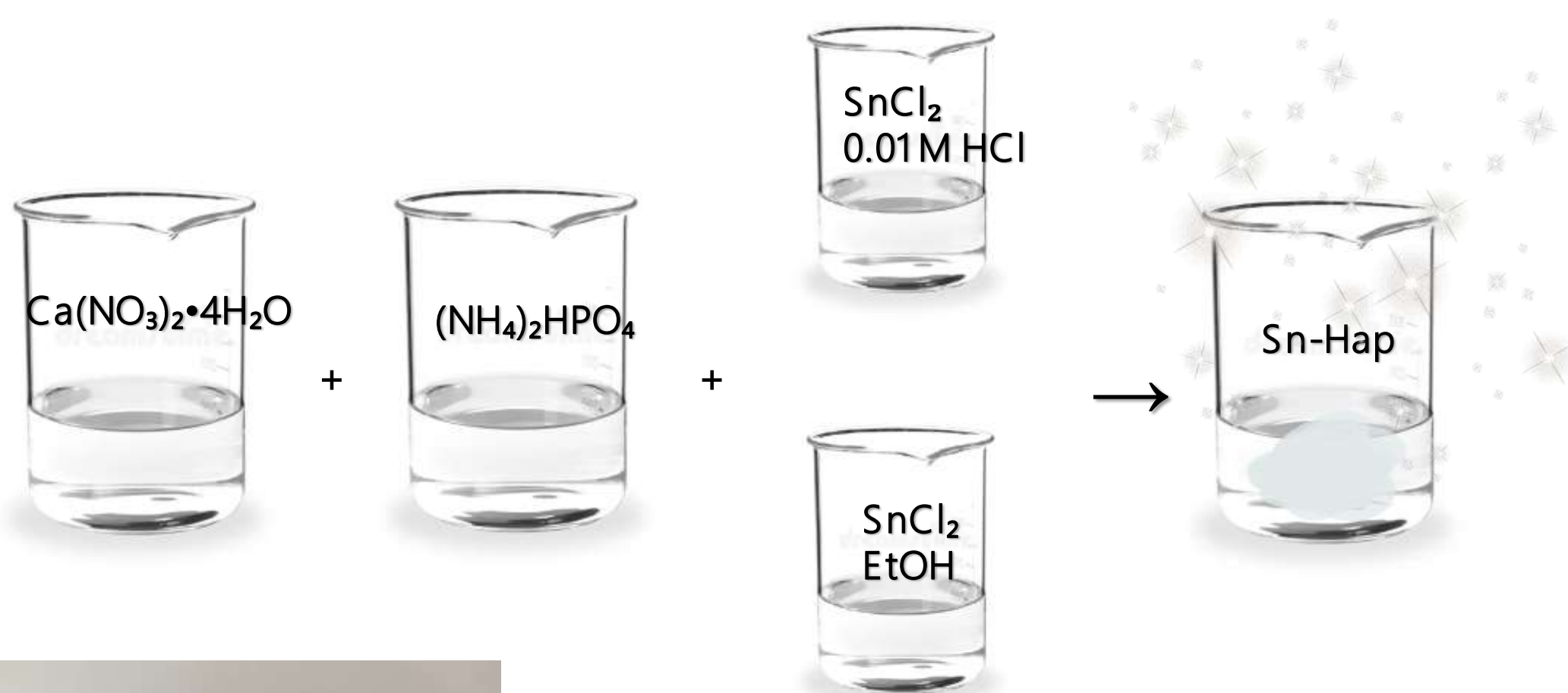


HAp



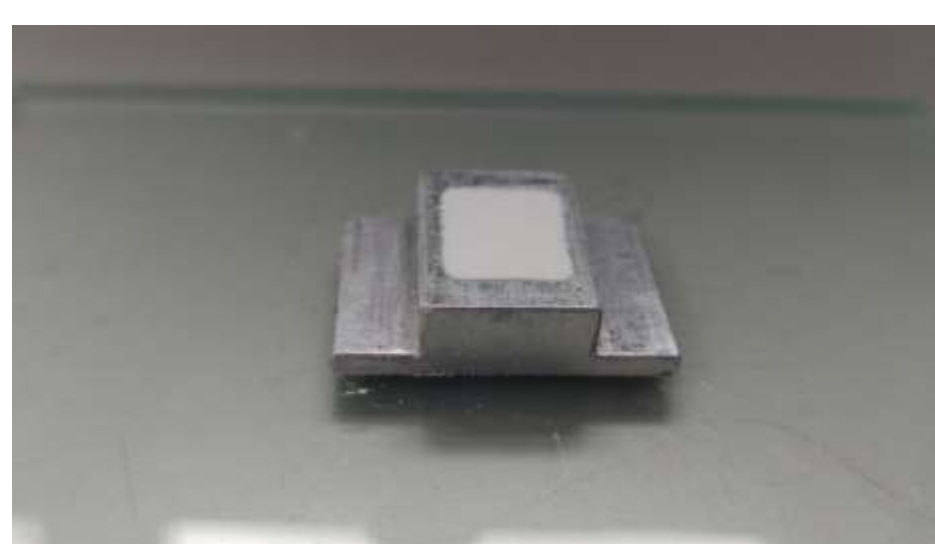
remineralization + long-lasting desensitization

METHOD



Processing

Annealed at 500–900°C, analyzed by XRD



RESULTS & DISCUSSION



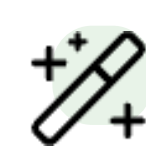
Ethanol Synthesis

Sharper XRD peaks indicate higher crystallinity and fewer defects.



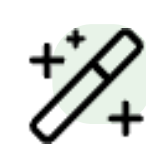
Sn Incorporation

Peak shifts confirm Sn²⁺ substitutes Ca²⁺, causing lattice strain.



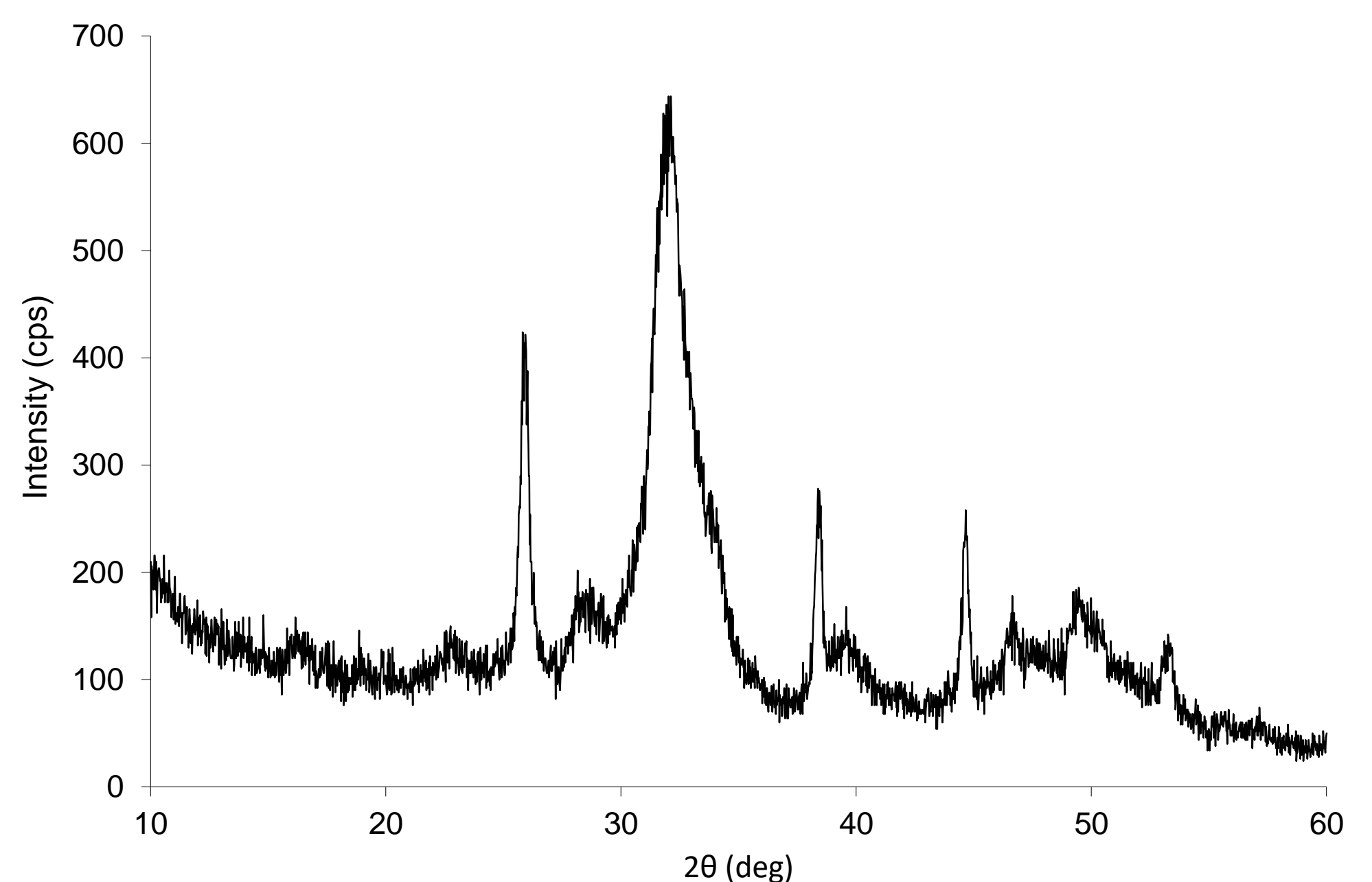
Annealing Effects

Crystallinity improves below 600°C; above 800°C decomposition occurs.



Acidic Media

Broader peaks suggest point defects and cation vacancies possibly enhancing bioactivity.



XRD pattern of Sn-substituted hydroxyapatite

CONCLUSION

Optimal Synthesis

Ethanol and 600°C annealing yield stable, enamel-like Sn-HAp.

Alternative Approach

Acidic synthesis may suit bioactive or resorbable materials.

Material Benefits

High crystallinity and Sn²⁺ integration promise long-term desensitization.

Next Steps

Optimize Sn content and test *in vitro* bioactivity.