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Physicochemical properties of a novel experimental alginic acid-enhanced bioceramic-based root canal sealer: A comparative in vitro evaluation

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[Appu, Tharani Elancovan^a](#); [Baskaran, Vasunthra^a](#); [Goh, Valentina Pui Nee^a](#); [Tee, Yu Jie^a](#); [Wong, Qiao Wen^a](#); [+4 authors](#)

^a Department of Dental Materials, Faculty of Dentistry, Asian Institute of Medicine, Science and Technology University, Kedah, Bedong, Malaysia

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Abstract

Aims: This study aims to evaluate the physicochemical properties of a new experimental alginic acid-incorporated bioceramic-based sealer (Bio-G) compared to commercialized BioRoot RCS.

Materials and Methods: Bio-G sealers with 0%, 3%, and 5% alginic acid concentrations were formulated and tested for flowability, film thickness, radiopacity, working time, setting time, solubility, dimensional stability, and pH. Standardized methodological methods were used and statistical analysis was performed using the one-way ANOVA with post hoc Tukey's HSD. **Results:** All Bio-G sealer groups met standards for flow (>20 mm) and film thickness (<50 µm). Bio-G (0%-algin)

exhibited the highest flow, solubility, and longest setting time, while Bio-G (3%-algin) and Bio-G (5%-algin) had comparable solubility with BioRoot RCS. Radiopacity was lower in all Bio-G sealers than in BioRoot RCS but exceeded the required minimum standard. Moreover, all Bio-G sealer groups maintained an alkaline pH. Conclusion: The incorporation of alginic acid influenced the physicochemical properties of Bio-G sealers, supporting their potential as alternative bioceramic materials for endodontic applications. © 2025 Journal of Conservative Dentistry and Endodontics.

Author keywords

Alginic acid; biomaterials; endodontics; material testing; mechanical properties; root canal; silicate

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Corresponding authors

Corresponding author	G.S.S. Lin
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Affiliation	Department of Restorative Dentistry, Kulliyyah of Dentistry, International Islamic University Malaysia, Kuantan Campus, Pahang, Kuantan, 25200, Malaysia
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