

Characterization and in vitro evaluation of microleakage and antibacterial properties of prepared ZnO and ZnO:Ag nano sealers

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Abstract

Undoped and Ag doped Zinc Oxide (ZnO, ZnO:Ag) nanopowders were prepared and compared to ZOE (Zinc Oxide Eugenol) and AH26 (Epoxy resin sealer) which are commonly used in dentistry as sealer. These nano sealers prepared via a modified sol-gel method using gelatin as polymerization agent. The undoped and Ag doped ZnO nanopowders prepared at calcination temperatures of 500, 600, 700°C for 8 hours. Also the microleakage and antibacterial property of the prepared samples were investigated. The prepared undoped and Ag doped ZnO nanopowders were characterized by a number of techniques, including x-ray diffraction (XRD) and transition electron microscopy (TEM) that results show their particle size and hexagonal (wurtzite) structure with presence of Ag metallic phase for Ag doped prepared samples. Results show that our prepared undoped and Ag doped ZnO nanopowders for using as sealer exhibit better microleakage and antibacterial properties comparing to ZOE and AH26 (common sealer). Therefore these prepared nanopowders are significant filling material to be used as sealer in root canal treatment.

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Figures:

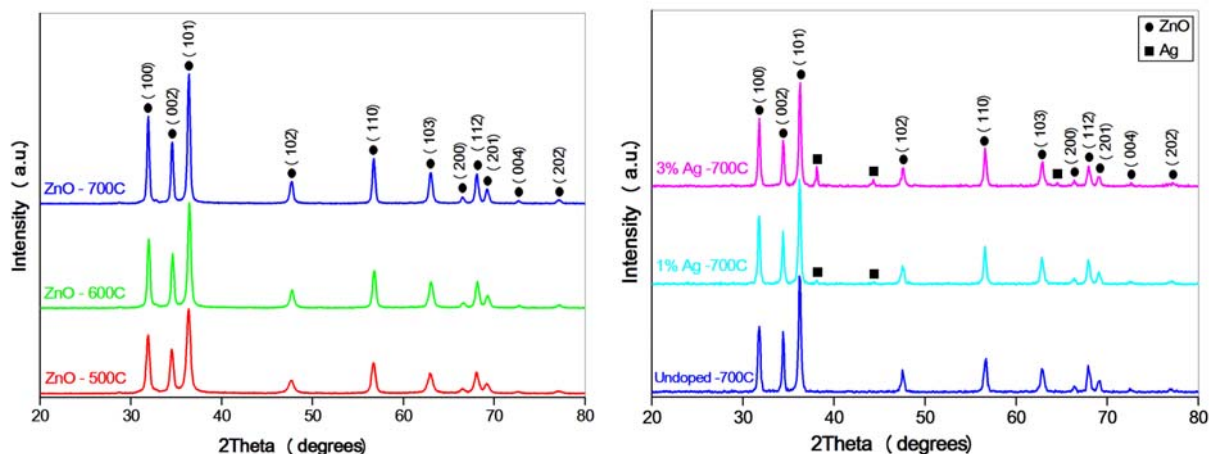


Figure1. XRD patterns of ZnO and ZnO:Ag nanoparticles prepared at different calcination temperatures of 500, 600, and 700°C.

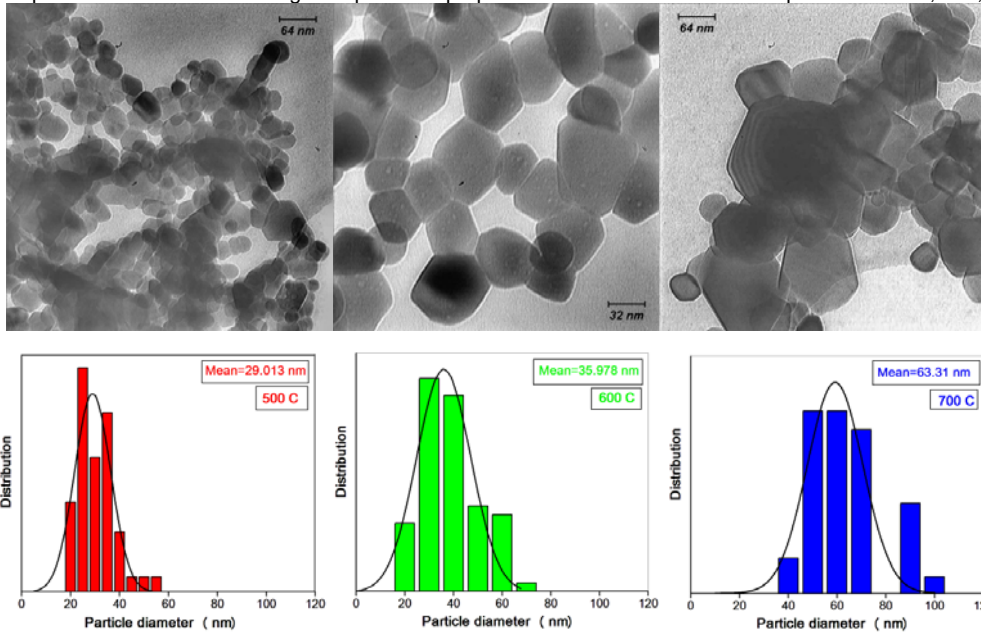


Figure 2. TEM graph of ZnO nanoparticles at 500, 600 and 700°C.

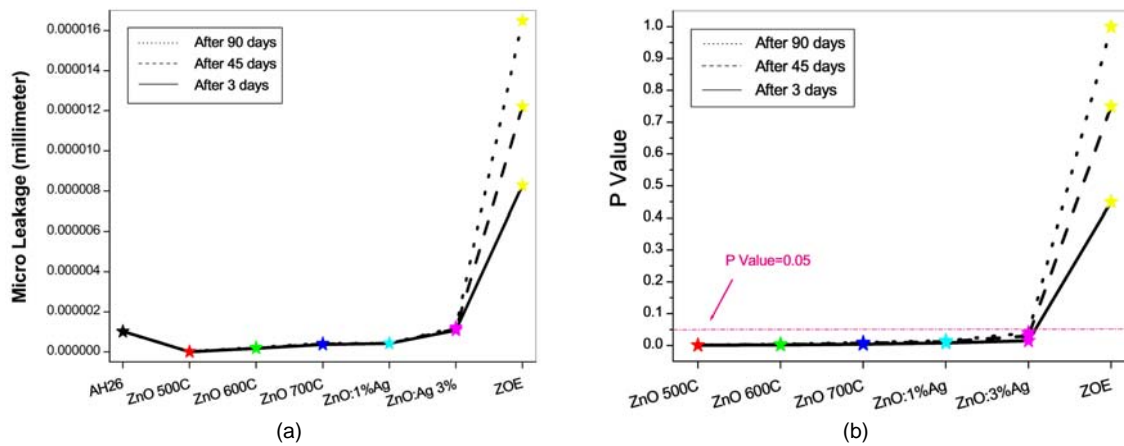


Figure3. (a) Microleakage and (b) Post-hoc analysis of the ZnO and ZnO:Ag nanoparticles comparing to AH26 and ZOE.

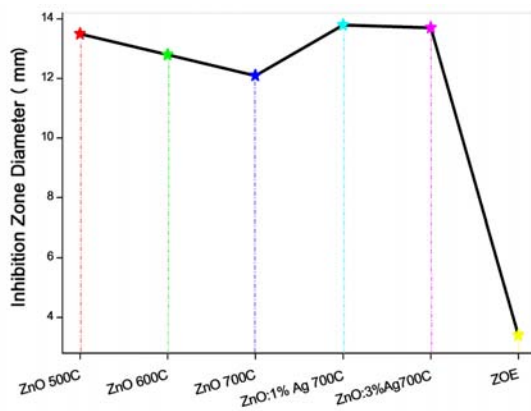


Figure4. Antibacterial properties of the undoped and Ag doped ZnO nanoparticles comparing to ZOE (ZnO micro powder).