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Ceramic composite calcium aluminate reinforcement with Ag particles synthesized by solid-stated reaction

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The composites cermetes are a combination of ceramic and metallic materials and these new materials have different properties that their precursors materials. In this work, the fabrication route of the composite $\text{CaO} \cdot \text{Al}_2\text{O}_3$ / Ag-10 wt.% is discussed. The chemical composition in powder form is submitted to high energy milling for 4 hours at 200 rpm in dry. The powder was compacted into cylindrical samples at 200 MPa by a uniaxial load. Then the samples obtained are sintered at 1500°C in air atmosphere for one hour into an electrical furnace. The manufactured materials were characterized by optic microscopy (OM), scanning electron microscopy (SEM-EDS), X-ray diffraction (XRD) and X-ray computed tomography (XR-CT). The density was obtained by Archimedes principle; the hardness and fracture toughness were determinate by indentation method. XRD results indicate the formation of different phases of calcium aluminates during the sintering process and also the Ag phase. These materials also present changes in bulk density, hardness, and fracture toughness compared with the reference sample.

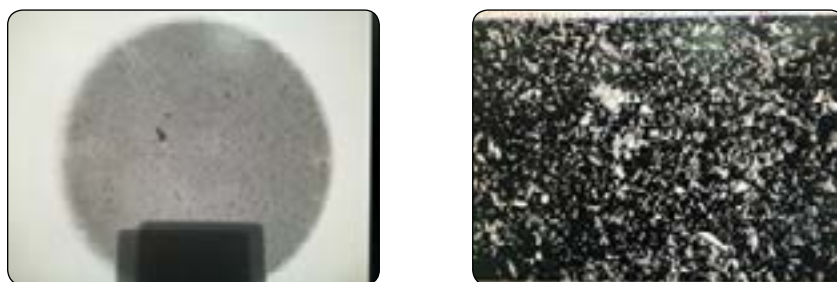


Figure 1. XR-CT of calcium aluminate composite with Ag synthesized by solid- state reaction during the sintering process.

Recent Publications:

1. Yongpan T., Xiaoling P., Haiyan Y., and Ganfeng T., "Formation Mechanism of Calcium Aluminate Compounds Base on High-Temperature Solid-State Reaction," *Journal of Alloys and Compounds*, Vol. 670, pp. 96-104, 2016.
2. Sunnegardh-Grönberg, K., Calcium aluminate cement as dental restorative, Mechanical properties and clinical durability, Umeå University Odontological Dissertations, No. 84, ISSN 0345-7532, ISBN 91-7305-589-1, 2004.
3. José G. Miranda Hernández, Miriam Vázquez Bustamante, Héctor Herrera Hernández, Carlos O. González Morán, Enrique Rocha Rangel, Elizabeth Refugio García, "Tenacidad a la fractura de compuestos cermetes $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ /Ag manufacturados por molienda de alta energía," *Revista Matéria*, Vol. 21, No.1, pp. 243-251, 2016.
4. S. Fjodor, and A. Maksim, "Comparative study on indentation fracture toughness measurements of cemented carbides", *Proc. Estonian Acad. Sci. Eng.*, Vol. 12, No. 4, pp. 388-398, 2006
5. A. Moradkhani, H. Baharvandi, M. Tajdari, H. Latifi, and J. Martikainen, "Determination of fracture toughness using the area of micro-crack tracks left in brittle materials by Vickers indentation test", *Journal of Advanced Ceramics*, Vol. 2, No. 1, pp. 87-102, 2013.

Biography

José G. Miranda has her expertise in development and manufacture of advanced materials in structural applications. Also, in the management, development, and evaluation of research projects, human resources training, participation in national and international conferences, and publication of articles in the national and international journals in the field of the synthesis and characterization of nanomaterials, metal composites and functional materials through powder metallurgy technique.

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