World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:9, No:05, 2015

Strengthening and Toughening of Dental Porcelain by the Inclusion of an Yttria-Stabilized Zirconia Reinforcing Phase

Authors : Buno Henriques, Rafaela Santos, Júlio Matias de Souza, Filipe Silva, Rubens Nascimento, Márcio Fredel

Abstract : Dental porcelain composites reinforced and toughened by 20 wt.% tetragonal zirconia (3Y-TZP) were processed by hot pressing at 1000°C. Two types of particles were tested: yttria-stabilized zirconia (ZrO2–3%Y2O3) agglomerates and pre-sintered yttria-stabilized zirconia (ZrO2–3%Y2O3) particles. The composites as well as the reinforcing particles were analyzed by the means of optical and Scanning Electron Microscopy (SEM), Energy Dispersion Spectroscopy (EDS) and X-Ray Diffraction (XRD). The mechanical properties were obtained by the transverse rupture strength test, Vickers indentations and fracture toughness. Wear tests were also performed on the composites and monolithic porcelain. The best mechanical and wear results were displayed by the porcelain reinforced with the pre-sintered ZrO2–3%Y2O3 particles.

Keywords : dental restoration, zirconia, porcelain, composites, strengthening, toughening, wear
Conference Title : ICMSEM 2015 : International Conference on Materials Science, Engineering and Manufacturing
Conference Location : Rome, Italy
Conference Dates : May 05-06, 2015