

1. Microstructural characterization of thermal barrier coatings by high power laser-glazing

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ABSTRACT: Plasma-sprayed thermal barrier coatings were laser-glazed by a high power laser in order to modify the structures. The microstructure of laser-glazed TBCs is investigated. The result indicates that a smooth and dense glazed surface with craters and a network of microcracks is obtained after laser-glazing. The laser-glazed region consists of a columnar microstructure. There are segmentation microcracks in the laser-glazed coatings, which don't run through the coatings along thickness. Surface roughness has been reduced significantly for the laser treated ceramic coatings.

2. Effect of K₂O contents on the releasing of nutrient ions from phosphate glass system

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ABSTRACT: Currently, the solubility of phosphate glasses has been extensively studied for potential glass fertilizer. This work presents the study of 45P₂O₅-20CaO-xK₂O-(29-x) Na₂O-6Al₂O₃ glass system, where x referred to 5, 10, 15 and 20 wt. % of K₂O. In this work, clear and free bubble glasses were obtained at melting temperature of 1300°C. The ions release and weight loss study is determined through the immersion of the glass samples in deionized water for a month under static condition. The results showed that the glass containing 15 wt. % of K₂O gives highest amounts of PO₄³⁻ ion and K⁺ ion released, and has a lower pH value compared to other glasses. Infrared

spectroscopy revealed the incorporation of K₂O in the glass system contributed to the formation of several phosphate units such as metaphosphate and pyrophosphate around 919 cm⁻¹ and 1119 cm⁻¹. The morphology analysis of the glass sample before and after immersion was found to be related with the glass solubility. From the study, the incorporation of K₂O in the glass system increased the glass solubility due to the destruction of the phosphate glass network.

3. The fabrication of MgB₂ film and Nano-bridge by EB and FIB

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ABSTRACT: 100nm thin Mg/B precursor films were prepared on SIC substrates in ZZSX-500 vacuum coating machine and annealed by electron-beam (EB) which only took fractions of a second. In this paper the best annealing duration to fabricate the superconducting MgB₂ thin films was investigated. Under the optimized annealing condition (accelerating voltage 15kV, electron beam current 5mA, annealing duration 0.7s), the superconducting MgB₂ thin film with critical temperature T_{conset}~35.3 K and transition width ΔT_c~1K was fabricated. Besides that, a nano-bridge (about 100×200nm²) was etched on the superconducting MgB₂ thin film by Focused Ion Beam (FIB). It exhibits the Josephson effects with critical current density j_c (10K, 0T) ~ 3.8×10⁷ A/cm². A little loss of superconducting properties was detected.

4. Study and analysis on thermal expansion properties of nylon sheet

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