Influence of TiO₂ on Chemical Stability, High Temperature and Electrochemical Properties of Alumina Ceramics based on η -Al₂O₃

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In this paper, the effect of titanium dioxide (TiO₂) on the high temperature performance, chemical stability and electrochemical property of alumina ceramics prepared by nano η -Al₂O₃ were analyzed. Different contents of TiO₂ (0, 1.5, 2.5 and 3.5 wt%) were added into nano η -Al₂O₃, and combined with PVA to prepare alumina ceramic samples. The samples were kept at three different sintering temperatures (1450 °C, 1550 °C and 1650 °C) for 2 h, and their properties were measured. The results reveal that the diffusion coefficient and sintering rate of alumina ceramics prepared by nano η -Al₂O₃ showed nonlinear growth as TiO₂ content increased. The results show that the wear resistance, erosion resistance and chemical stability of alumina ceramics prepared by nano η -Al₂O₃ were very high when the sintering temperature and amount of TiO₂ were 1650°C and 2.5wt%, respectively. The electrochemical property of prepared ceramics was studied by cyclic voltammetry measurements which indicated the enhancement of double-layer capacitive property due to the introducing TiO₂ to Al₂O₃ network.

Keywords: TiO₂; Nano η -Al₂O₃; High temperature properties; Chemical stability; Sintering rate; Electrochemical property

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