

## **Effect of Calcination and Zirconia Addition on the Stability of Anatase Titania Phase**

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### **ABSTRACT**

Titania-zirconia composites were prepared in order to combine both the bioactivity of anatase titania and the mechanical strength of tetragonal zirconia. Pure titania, pure zirconia and titania-zirconia composite (20-80vol% zirconia) sol-gel powders were first prepared and divided into two groups, one being subject to calcination at 350°C for 2 hours and the other without calcination. The powders were then pressed and sintered at 450°C, 600°C, 800°C, and 1000°C, respectively. Scanning electron microscopy (SEM) and x-ray diffraction (XRD) were employed to study the effect of calcination, sintering temperature and composition on the microstructural development of the composites. It was shown that samples without calcination had rutile phase in the titania-rich composites and monoclinic phase in the zirconia-rich composites. In contrast, samples subject to calcination retained anatase phase up to 800°C. Addition of 20vol% zirconia into titania also retarded the anatase to rutile phase transformation, resulting in both anatase titania and tetragonal zirconia phases in the composites.

**Keywords:** Titania, zirconia, composite, sol-gel and anatase