

# Effect of TiO<sub>2</sub> and ZrO<sub>2</sub> reinforcements on properties of Al<sub>2</sub>O<sub>3</sub> coatings fabricated by thermal flame spraying

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## Description

The alumina composite coatings reinforced with 25% ZrO<sub>2</sub> (denoted as AZ-25) and 3% TiO<sub>2</sub> (denoted as AT-3) were deposited on low carbon steel using a thermal flame spraying. The microstructure, phase composition, microhardness and tribological properties of the coatings were investigated. The XRD results of the coatings reinforced by TiO<sub>2</sub> (AT-3) revealed the presence of  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> phase as matrix and new metastable phases of  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> and  $\kappa$ -Al<sub>2</sub>O<sub>3</sub>. However, the coatings reinforced by ZrO<sub>2</sub> (AZ-25) consist of  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> as matrix, *q*-ZrO<sub>2</sub> and *m*-ZrO<sub>2</sub>. In most studied conditions, the AT-3 coating displays a better tribological performance, i.e., lower coefficient of frictions and wear rates, than the AZ-25 coating. It was also found that the microhardness of the coatings was decreased with the reinforcement of ZrO<sub>2</sub> and increased with TiO<sub>2</sub>.