

TA-3
Technology of Production and Testing of Composite Armour
Materials

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Abstract:

ceramic matrix composites have been developed as an important engineering material for many structural applications and armor protection. β -spodumene ($\text{Li}_2\text{O}\cdot\text{Al}_2\text{O}_3\cdot 4\text{SiO}_2$) has been used to improve the physical and mechanical properties of alumina matrix ceramic composites. The results show that the presence of 7.5 wt. % spodumene significantly reduces the porosity, improves the sintering behaviour and increases the mechanical properties of alumina ceramic composites. The target consists of two-component composite armour, the front facing material is ceramic composite tile (alumina / β -spodumene) and the backing material is fiber reinforced polymeric material (S-2 glass reinforced epoxy M-HY956). Numerical simulations (AUTODYN-2D) were used to simulate the experimental work results, which include normal impact of two types of 7.62x39mm ammunition (ball with mild steel penetrator and API) into ceramic composite armour.

Ballistic impact test results show that the manufactured ceramic composite targets are defeated both the 7.62x39mm ball with mild steel penetrator and API bullets with areal density range (4.5-5.1 g/cm²).