



**SYNTHESIS AND PROCESSING OF COMPOSITES BY REACTIVE  
METAL PENETRATION**

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## ABSTRACT

This is a study about the effects of sintering temperature changes at various ratio percentage composition of the ceramic (alumina powder) and aluminum powder on the microstructure, hardness, strengthening and porosity behavior. The composition of sample earlier produced by compacting process using the pressure at 400 kpa into various percentage ratio are sample at 90% aluminum powder and 10% alumina powder, 80% aluminum powder and 20% alumina powder, 70% aluminum powder and 30% alumina powder, 60% aluminum powder and 40% alumina powder, 50% aluminum powder and 50% alumina powder. The total amount weights of each sample are noted for 10 gram respectively. The sample were sintered at various temperature such as 450°C, 550°C, 650°C, 750°C and 850°C. Experimental result on different compositions of metal-ceramic reaction couples indicates that reactive metal penetration can be general procedures to composite synthesis. Porosity test were carried out to determine the effect reactive metal penetration affords near-net-shape capability especially composition relation between aluminium and alumina. It was indicate that sample which were sintered at 450°C and 550°C were heavier than other temperature samples soaked in water for two hours. The maximum strength test that indicated in the sampe occur high sintered temperature at 850°C, sample of high load noted at high load occur in acomposition 90% aluminum powder and 10% alumina powder. The fracture toughness of reactively-formed metal ceramic composites increases with the increased in aluminium concentration and at high sintered temperature where this composition interact actively. Hardness value for the sample is also determined followed by microstructures observation. Generally, the strength and hardness value of the synthesized composite metal tend to increase with the rise of the sintering temperature.

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