

## **Comparison study in consolidation of yttria reinforced iron-chromium composites using conventional and microwave sintering technique**

### **Abstract**

This research is focused on studying the density and mechanical properties of iron-chromium composites consolidated by innovative rapid microwave sintering technology against conventionally sintered counterparts using slow heating crucible furnace. Another aim of this study is to assess the viability of yttria ( $Y_2O_3$ ) ceramic particulates as reinforcement to the iron-chromium composites. Fabrication of iron-chromium-yttria composites consolidated in microwave furnace and conventional crucible furnace was successfully accomplished. Improvement of density is evident in microwave sintered composites. The  $Y_2O_3$  addition significantly increases the hardness of the composite (118 Hv for microwave specimens as opposed to 110Hv for conventional specimens). The study also successfully established the viability of microwave sintering technique for consolidating iron based powder metallurgy composites by up to 80% reduction of sintering time.

**Keywords;** Composite, Densification, Iron-Chromium, Microwave Sintering, Yttria