

Optimization of holding time on microwave irradiation of the composite iron-chromium reinforced with alumina particle

W. Rahman, J.B. Shamsul, M.N. Mazlee

Abstract. In this study, the effect of holding time on the microwave sintered 84Fe-11Cr-5Al₂O₃ metal matrix composite (MMC) was investigated. Sintering was carried out in a tubular microwave furnace HAMiLab-V3 under N₂ atmosphere. The holding time was selected between 0 to 75 minutes with increment of 15 minutes respectively. A study of microstructure and physical properties was carried out on sintered samples. It was discovered that, when the samples sintered at 1400°C with 20°C/min heating rate, the hardness was significantly increased from 110Hv to 160 Hv for holding time ranging from 30 to 45°C/min. Further increment until 75 minutes of holding time, no significant changes were obtained and hardness values were at steady state. The enhancement of bulk density and reduction of porosity were observed commences at 30 minutes until 45 minutes holding time. However, the results showed that the optimum holding time was at 45 minutes where the micro hardness is at the highest point which is about 160Hv.

Keywords: Hardness, Holding Time, Microwave Sintering, Porosity, Relative Density