

Microstructure and microhardness properties of Fe-Cr-Al₂O₃ composites

Abstract

The requirement for high performance materials of high wear and corrosion resistance lead to an increasing interest in ferrous matrix composites. Metal matrix composite of iron-chromium reinforced with alumina was fabricated using conventional powder metallurgy route: mixing, pressing and sintering. The mixing stage is critical if a homogeneous material with good properties is to be produced. In the present investigation, Fe-Cr-Al₂O₃ composites with various mixing duration were analyzed. According to X-ray diffraction (XRD), the composites have formed binary alloy of Fe-Cr alloy. The microstructure of the composites contains mostly alumina particle distributed uniformly throughout iron-chromium matrix. Half an hour mixing duration gave highest in micro-hardness value (86.68 HV), percentage of shrinkage (1.9%) and bulk density (6.0006 gcm⁻³), but lowest percentage of porosity (7.3).