عنوان مقاله:

Reactive Spark Plasma Sintering of Y۳Al۵O۱۲-MgAl۲O۴ Composites

محل انتشار:

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خلاصه مقاله:

In this study, Y۳Al۵O۱۲-MgAl۲O۴ (YAG-Spinel) composites, with different molar ratios (۱:۱ and ۱:۳), were in-situ fabricated using Reactive Spark Plasma Sintering (RSPS) technique. To this end, Al۲O۳, MgO, and Y۲O۳ powders were used as the starting materials. In-situ formation of YAG-Spinel composites was investigated based on the reaction ۳.۵ Al۲O۳ + MgO + ۱.۵ Y۲O۳ → Y۳Al۵O۱۲ + MgAl۲O۴. Both synthesis and densification processes were accomplished using a single-cycle RSPS with one-step heating. The RSPS process was performed at a sintering temperature of ۱۳۰۰ °C for ۳۰ min hold time with a maximum uniaxial pressure of ۹۰ MPa under vacuum conditions. The synthesized phases and microstructures were investigated by X-ray diffraction and field emission scanning electron microscopy. The unwanted phases such as YAP (YAlO۳) in a composite microstructure were removed using LiF additive. LiF was used as a sintering aid in the process of sintering. The in-situ synthesized YAG-Spinel composites exhibited no internal infrared transmittance over the infrared wavelength ranges of ۲.۵-۲۵ μm.

کلمات کلیدی:

Y۳Al۵O۱۲ - MgAl۲O۴ Spinel, Reactive Spark Plasma Sintering, Optical properties