

Preparation of Nd₂Fe₁₄B Particles via Thermochemical Process

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Permanent magnetic particles have widely used in various applications such as magnetic motors, generators, refrigerators and magnetic sensors. Since the discovery of the excellent magnetic properties of NdFeB hard magnetic alloys, intense research has been focused on novel synthesis techniques and optimum microstructural development. Several methods such as powder metallurgy methods and rapid quenching techniques have been developed for producing the hard magnetic alloys. However, the methods require high purity elements as starting materials and energy intensive. Also, to prepare NdFeB particles, polyol reduction method has been attempted, which enables to produce small particles in low temperature condition. As compared to the traditional metallurgy methods, the polyol method exhibits limitations in magnetic properties. Here, we have fabricated Nd₂Fe₁₄B particles via thermochemical process. The precursor particles consisting of rare-earth and transitional metal oxides were fabricated by spray drying methods. After the reduction-diffusion process, Nd₂Fe₁₄B particles were obtained, which the properties were adjusted by controlling particles size, reduction temperature and washing method.