

Chemical synthesis of NdFeB particles with high (BH)max by modified reduction-diffusion method

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We prepared the NdFeB magnetic particles with high (BH)max using spray drying and reduction-diffusion (RD) techniques. The magnetic properties could mainly depend on the Nd₂Fe₁₄B phase purity, crystallinity and microstructure. Towards this direction, we report the cost effective and a facile chemical synthesis including spray drying and reduction-diffusion (RD) process with some modifications [1, 2]. Importantly, we investigated the annealing effect for NdFeB oxide powders and it is very important to control the final particles structural and magnetic properties. Different annealing conditions from 700 to 1000 °C for annealing process of oxides were used. Among them, the 800 °C results the NdFeB particles with improved magnetic and structural properties. The NdFeB particles prepared using modified RD process shows the high (BH)max of 14 MGOe, coercivity (H_c) of 3000 Oe, remanence (M_r) of 137 emu/g and saturation magnetization (M_s) of 151 emu/g. The M_s value was close to the bulk NdFeB (168 emu/g) [2]. This is attributed to the shape uniformity of NdFeB particles and phase purity with high crystallinity. Further more, as prepared Nd₂Fe₁₄B particles has been used to produce the sintered NdFeB magnets by vacuum annealing with lower doping content of NdHX particles.

References:

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