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1 Design, preparation and characterization of iron nitride magnetic abrasives

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9 Abstract

10 In order to effectively polish the surface of the titanium alloy workpiece, a novel
11 type of iron nitride magnetic abrasives was designed, prepared and characterized.
12 Theoretically, first-principles were used to analyze the effects of phase compositions
13 of iron nitrogen compounds on the mechanical and magnetic properties of the
14 abrasive, and ϵ -Fe₃N and γ' -Fe₄N were determined as the grinding phase compositions
15 with the simultaneously improved properties of hardness, ductility and magnetism. In
16 the experiments, the core-shell structured iron nitrogen compounds were prepared by
17 nitriding the iron powders of about 250 μ m with ammonia at 600 °C, and the effects
18 of nitriding time, ammonia pressure and cooling method on the product were
19 investigated. The composition, morphology, magnetic properties and mechanical
20 properties of the product were characterized by X-ray diffraction (XRD), scanning
21 electron microscope (SEM), magnetometer and nanoindenter, respectively. Under

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