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The capability of cerium (Ce) to improve the magnetic properties of Nd₂Fe₁₄B magnet: A computational approach

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Neodymium-based permanent magnets (Nd₂Fe₁₄B) are the potential permanent magnets for use in various applications such as wind turbines and electric vehicles due to their high magnetic field strength and resistance to demagnetisation. However, they suffer from low operating temperatures below 585 K and poor mechanical and vibrational properties. In this study, we investigate the effect of Ce on the magnetic and mechanical properties of Nd₂Fe₁₄B magnets using the ab initio density functional theory (DFT) approach. The NdCeFe₁₄B magnets are found to be thermodynamically and mechanically stable. The alloying of Nd with Ce improves the stability and magnetic strength of Nd₂Fe₁₄B permanent magnets. The findings will provide insight into the future development of permanent magnetic compounds with good magnetic strengths.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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