Special Issue

Rare Earth-Free Permanent Magnets: From Modeling to Functional Materials

Message from the Guest Editor

As global demand for permanent magnets grows in clean energy, electric transportation, and electronics, reliance on critical rare earths like Nd, Dy, and Tb raises sustainability and supply concerns. Developing high-performance, rare earth-free, and light rare-earth magnets is a key research priority. This Special Issue will cover the full spectrum of research on rare earth-free and Ce-based permanent magnets, from theoretical modeling and computational materials design to experimental synthesis, advanced characterization, property optimization, and integration into functional devices. Topics include, but are not limited to, the following: Mn-based alloys (e.g., MnAl, MnBi), Fe–Ni $L1_0$ (tetrataenite), Fe–N phases, Alnico, La/Ce-based intermetallics, Heusler compounds, and novel interstitially modified or nanostructured systems. We welcome studies that combine modeling with experimental validation, explore sustainable manufacturing (e.g., additive methods), and address real-world performance challenges. This Special Issue unites experts to shape the future of sustainable permanent magnets, reducing rare earth dependence while meeting performance demands.

Guest Editor

Dr. Tej Lamichhane

Physics and Engineering, University of Central Oklahoma, 221 G Howell Hall, Edmond, OK 73034, USA

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Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
magnetochemistry@mdpi.com

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Editor-in-Chief

Prof. Dr. Carlos J. Gómez García
Department of Inorganic Chemistry, Faculty of Chemistry, University of Valencia, C/Dr. Moliner 50, 46100 Burjasot, Spain

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