

Magnetocaloric alloys for active magnetic regenerative refrigeration

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In response to the escalating demand for energy-efficient refrigeration, active magnetic refrigeration (AMR) has emerged as a promising solution, with researchers focusing on identifying environmentally friendly solid-state refrigerants. Among various candidates, including Gd and Heusler alloys, the evaluation criteria typically revolve around parameters such as isothermal magnetic entropy change (ΔS_M) and adiabatic temperature change (ΔT_{ad}). However, the complexities of AMR systems demand a broader assessment, considering factors like thermal conductivity, corrosion resistance, and heat transfer coefficients.

To address this, an in-house AMR system has been developed specifically for testing different magnetic refrigerants. This system is being utilized to evaluate $Mn_xFe_{5-x}Si_3$ compounds with varying compositions to identify the optimal blend for room-temperature refrigeration. By aligning experimental methodologies with real-world application requirements, this study aims to advance the development of efficient magnetic refrigeration technologies.

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