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# Iron and Manganese based Magnetocaloric Materials for Near Room Temperature Thermal Management

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## Abstract

Thermal management technology based on the magnetocaloric effect offers several advantages over conventional gas compression cooling. The efficiency of magnetic cooling systems can be much higher than conventional gas based cooling technologies. Additionally, ozone layer depleting chemicals are not used and there is reduced noise and vibrations. Iron and manganese based magnetocaloric materials (MCM) are promising due to the challenges surrounding the use of conventional rare earth based MCM. We review the recent progress in the development of iron and manganese based MCM. The magnetic phase transitions, processing techniques, performance, as well as applications of these materials are discussed. Critical analysis to determine the critical exponents and phase transition behavior of these MCM, using modified Arrot plot, critical isotherm plots, the Kouvel-Fisher method, Landau theory and the Bean-Rodbell model, is also presented.

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**Key words:** Magnetocaloric materials, magnetocaloric effect, Fe based alloys, Mn based alloys, modeling

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