

Abstract Submitted
for the OSF20 Meeting of
The American Physical Society

Cooling without warming: New Materials for Environmentally Friendly Refrigeration BABAJIDE AKINTUNDE, Department of Physics, Miami University, Oxford, OH 45056, ARJUN PATHAK, PRAYUSHI BHORANIA, Department of Physics, SUNY Buffalo State, Buffalo, NY 14222, MAHMUD KHAN, Department of Physics, Miami University, Oxford, OH 45056 — Improving energy efficiency and mitigating climate change are current topics of significant global interest. Magnetic refrigeration can help in the realization of these goals. Unlike the conventional refrigerators, which use greenhouse effect related gases, thereby contributing to global warming, magnetic refrigeration is environmentally friendly. In addition, this technology is about 20-30% more energy efficient than the current cooling technology. Magnetic refrigeration technology utilizes the phenomenon of magnetocaloric effect (MCE), the process of heating and cooling of magnetic material when exposed to an external magnetic field. Magnetic materials exhibiting large MCE near room temperature are desired for application in this technology. In this study, we prepare a series of $\text{Mn}_{0.5}\text{Fe}_{0.5+x}\text{Ni}_{1-x}\text{Si}_{0.94}\text{Al}_{0.06}$ materials with potential application in magnetic refrigeration, using a conventional arc-melting technique. These materials are composed of cheap and non-toxic elements that address some drawbacks associated with several previously developed materials. The structural, magnetic, and magnetocaloric properties of these materials will be presented.

Babajide Akintunde
Miami University

Date submitted: 25 Sep 2020

Electronic form version 1.4