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MnP nanorod films with desired magnetocaloric and thermoelectric properties for novel magnetic cooling device \f1[1] CHANG-MING HUNG, RICHA POKHAREL MADHOGARIA, University of South Florida, ANH TUAN DUONG, RAJA DAS, Phenikaa University, SUNGLAE CHO, University of Ulsan, HARIHARAN SRIKANTH, MANH-HUONG PHAN, University of South Florida — h $-abstract-$\pard A novel magnetic cooling device (MCD) that comprises thermoelectric (TE) and magnetocaloric (MC) materials is proposed. A sandwiched structure has a MC material in the center and two TE materials at the outer parts. The presence of a TE material in the MCD guides the heat flow direction and enhances heat pulsation. In this case, the usage of a TE material that combines large thermopower (TP) with small MC responses within a similar temperature region enhances not only magnetic flux density but also heat exchange efficiency. In this study, we demonstrate that MnP thin films with integrated TE and MC functionalities are an potential candidate for the proposed MCD. The MnP films were grown on Si substrates at 300, 400 and 500C, and both the MC and TE effects were investigated systematically. The results indicate 400 ^{o}C sample has the optimal TC and MC responses. A large TC effect is observed in the temperature region 300 – 450 K. The largest power factor of 41.46 μW m^{-1} K^{-2}is achieved at T = 400 K. Therefore, in this temperature region, the film shows a low MC effect but a strong magnetic response that gives rise to the enhanced TC effect. In addition, these properties would enable the MCD to operate at high frequency. \pard-/abstract-\

[1]Department of Energy

Chang-Ming Hung
University of South Florida

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