Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Large magnetovolume effect induced by ferromagnetic-antiferromagnetic competition in a cobaltite perovskite[1] PING MIAO, High Energy Accelerator Research Organization, XIAOHUAN LIN, Peking University, AKIHIRO KODA, SANGHYUN LEE, YOSHIHISA ISHIKAWA, SHUKI TORII, MASAO YONEMURA, High Energy Accelerator Research Organization, TAKASHI MOCHIKU, National Institute for Materials Science, HAJIME SAGAYAMA, SHINICHI ITOH, High Energy Accelerator Research Organization, YINXIA WANG, Peking University, RYOSUKE KADONO, TAKASHI KAMIYAMA, High Energy Accelerator Research Organization — Materials that show negative thermal expansion (NTE) have significant industrial merit because they can be used to fabricate composites whose dimensions remain invariant upon heating. In some materials, NTE is concomitant with the spontaneous magnetization, known as the magnetovolume effect (MVE). Here we report a new class of MVE material; namely, a layered perovskite $PrBaCo_2O_{5.5+x}$($0 \leq x \leq 0.41$), in which strong NTE ($\beta \approx$ -3.310^{-5} K^{-1} at $x = 0.24$) is triggered by embedding ferromagnetic (F) clusters into the antiferromagnetic (AF) matrix. The strongest MVE is found near the boundary between F and AF phases in the phase diagram, indicating the essential role of competing interaction between the F-clusters and the AF-matrix. Furthermore, the MVE is not limited to the $PrBaCo_2O_{5.5+x}$ but is also observed in the $NdBaCo_2O_{5.5+x}$. The present study provides a new approach to obtaining MVE and offers a path to the design of NTE materials.

[1]The study was financed by the S-type project (No. 2014S05) of KEK

Ping Miao
Texas A
M Univ

Date submitted: 09 Nov 2016 Electronic form version 1.4