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초록내용

발표번호	DG-02[15:45-16:00]
분과	응집물질물리학분과 (Condensed Matter Physics Division)
저자	PARK Jihoon, HONG Yang-Ki (발표자 일반), CHOI Chul-Jin[1], LEE Jung Goo[1], KIM Chul Sung[2] *Department of Electrical and Computer Engineering and MINT Center, The University of Alabama, Tuscaloosa, AL, USA. [1]Korea Institute of Materials Science, Changwon, Kyung-Nam, South Korea. [2]Department of Physics, Kookmin University, Seoul, South Korea.*
제목	Theoretical Calculation of Maximum Energy Product for Mn(Al, Bi) Nanomagnets
초록본문	The figure of merit for permanent magnet is the maximum energy product $(BH)_{max}$ in the units of MGOe. The theoretical $(BH)_{max}$ limit is 64 MGOe for sintered $Nd_2Fe_{14}B$ magnet. However, its low operation temperature, which may lead to loss of machine power, and availability of rare-earth and transition metals are potential barriers to electric vehicle's motor and other applications. Thus, aiming at developing high temperature magnets without rare-earth and transition elements, we have theoretically calculated the $(BH)_{max}$ for LTP-phase MnBi and τ-phase MnAl alloys using density functional theory and also for their core-shell nanomagnets by modified Skomski's equations [1]. Our calculations predict 20 MGOe (3.66 μB/f.u.; Hk = 53 kOe) and 25 MGOe for MnBi and MnAl alloys, respectively. Accordingly, it is envisioned that core-shell MnBi-soft metal and MnAl-soft metal micro/nanoparticles will exhibit large remanent magnetization, thereby increasing the $(BH)_{max}$ to 51 MGOe and 53 MGOe for MnAl and MnBi core-shell nanoparticles, respectively. [1] R. Skomski, and J.M.D. Coey, "Giant energy product in nanostructured two-phase magnets", *Phys. Rev. B*, 48, 21 (1993).

돌아가기