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Colossal Spincaloritronic Cooling by Adiabatic Spin-Entropy Expansion in Nanospintronics HIROSHI KATAYAMA-YOSHIDA, Osaka University, TETSUYA FUKUSHIMA, VAN AN DINH, KAZUNORI SATO, ISIR, Osaka University — The exchange interactions in DMS are short ranged and can not play an important role for realizing high-T_C because the solubility of magnetic impurity is too low to achieve magnetic percolation [1]. We show that spinodal nano-decomposition under layer-by-layer crystal growth condition (2D) leads to characteristic quasi-one dimensional nano-structures (Konbu- Phase) with highly anisotropic shape and high T_C ($\langle$ 1000K) even for low concentrations in DMS [2]. We design a spin-currents- controlled 100 Tera bits/icnh^2, Tera Hz switching, and non-volatile MRAM without Si-CMOS based on Konbu-Phase [3]. In addition to the conventional Peltier effect, we propose a colossal spincaloritronic cooling based on the adiabatic spin- entropy expansion in a Konbu-Phase (Zn,Cr)Te with very high blocking temperature (T_B $\rangle$ 1000 K) by spinodal nano- decomposition and by nano-column of Half-Heusler NiMnSi (T_C = 1050 K) [4]. [1] K. Sato et al., Phys. Rev. B70, 201202 (2004). [2] H. Katayama-Yoshida et al., Phys. stat. sol. (a) 204 (2007) 15. [3] Japanese Patent: JP3571034, US Patent: US 7,164,180 B2, EU Patent: EP 1548832A1, Taiwan Patent:1262593, Korean Patent: 0557387. [4] H. Katayama-Yoshida et al., Jpn. J. Appl. Phys. 46 (2007) L777.

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