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One-Dimensional Magnetic Chain Fragmentation in Ti/Ga Modified Multiferroic DyMn_2O_5 SUN-HEE KANG, HAI-JOON LEE, ILL-WON KIM, University of Ulsan, TAE-HWAN JANG, YOON-HEE JEONG, Pohang University of Science and Technology, TAE-YEONG KOO, Pohang Accelerator Laboratory, Pohang University of Science and Technology — We have studied the effect of Ga^{3+} substitution into Mn^{3+} site in DyMn_2O_5 on its multiferroic characteristics. Crystallographic structural, thermal, dielectric and magnetic properties are measured and discussed in terms of the dilution of magnetic Mn^{3+} ions. Replacement of Mn^{3+} with Ga^{3+} changes the compound into a disordered multiferroic system and colossal magnetodielectric effect observed in DyMn_2O_5 disappears quickly below $x \sim 0.1$ in $\text{DyMn}_{2-x}\text{Ga}_x\text{O}_5$. However as the content of Ga increases above $x \sim 0.1$, a new type of ferroelectric transition identified by a peak in dielectric constant is evolved from the slowly varying dielectric background. Moreover remarkable enhancement of dielectric constant at ferroelectric transition temperature is continued even up to the solubility limit of Ga ($x \sim 0.2$). This observation suggests one possible example of the channel for ferroelectricity in the disordered multiferroic system.

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