

# Low-Field Magnetoresistance and Magnetic Study of $\text{Ba}_2\text{Fe}_{1+x}\text{Mo}_{1-x}\text{O}_6$

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**Abstract**—We have investigated low-field magnetoresistance (MR) and magnetic properties of  $\text{Ba}_2\text{Fe}_{1+x}\text{Mo}_{1-x}\text{O}_6$  ( $x = 0-0.2$ ) in point of some effects of Fe–Mo disorder between the Fe and Mo ions. Polycrystalline samples have been prepared by the conventional solid-state reaction in a stream of 5%  $\text{H}_2$ –Ar gas. The X-ray data indicate that symmetry is cubic and the data are compatible with the  $Fm\bar{3}m$  space group. All samples are single phase and exhibit a series of superstructure-reflection lines due to cation order of Fe and Mo. The magnitude of negative MR is 2.9% for  $x = 0$  and 1.5% for  $x = 0.2$  at room temperature with magnetic fields of 7 kOe. Saturation magnetization is  $2.8 \mu_B/\text{f.u.}$  for  $x = 0.2$  which is smaller than the value of  $3.8 \mu_B/\text{f.u.}$  for  $x = 0$ . This large variation of magnetization between  $x = 0$  and 0.2 arises from the disorder at the Fe and Mo sites.

**Index Terms**—Double perovskite, magnetization, magnetoresistance, resistivity.