Abstract Submitted
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Doping-Tunable Ferrimagnetic Phase with Large Linear Magnetoelectric Effect in a Polar Magnet $Fe_2Mo_3O_8$[1] TAKASHI KURUMAJI, RIKEN, CEMS, SHINTARO ISHIWATA, Univ. Tokyo, YOSHINORI TOKURA, RIKEN, CEMS, STRONG CORRELATION PHYSICS RESEARCH GROUP TEAM, ISHIWATA LABORATORY TEAM — The magnetoelectric (ME) effect, i.e., cross control of magnetization (electric polarization) by an external electric (magnetic) field, may introduce a new design principle for novel spin devices. To enhance the ME signal, control of a phase competition has recently been revealed as a promising approach. Here, we report the successful chemical-doping control of the distinct ME phases in a polar magnet $Fe_2Mo_3O_8$, in which an antiferromagnetic state is competing with a ferrimagnetic state. We demonstrate that Zn doping stabilizes the metamagnetic state to realize the spontaneous ferrimagnetic state and varies the ME coefficients from large negative to large positive values; for instance, the diagonal component of the ME coefficients under the magnetic field perpendicular to the polar axis varies from -142??ps/m to 107??ps/m by doping Zn from 12.5% to 50%. This remarkable doping control of the ME property originates from coexisting distinct ME mechanisms, which are selectively tunable by substituting one of the two distinct magnetic sites in the unit cell with nonmagnetic Zn.

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