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Chemical substitution induced ferroelectric polarization rotation in $BiFeO_3$ thin films[1] ICHIRO TAKEUCHI, DAISUKE KAN, ANBUSATHAIAH VARATHARAJAN, University of Maryland — The direction of the polarization vector in ferroelectric materials is an important parameter critical to a number of applications. Polarization orientation in ferroelectric thin films can be controlled by various approaches such as electric- field induced rotation and strain engineering using exotic substrates. We have performed systematic chemical substitution of rare earth cationic dopants, in particular Sm in the $BiFeO_3$thin films, and found that the polarization vector rotates from the (111) to the (001) direction as a continuous function of the dopant concentration. This is accompanied by enhanced dielectric ϵ_{33} as well as piezoelectric coefficient d_{33}, and the maximum in d_{33} (110 pm/V) is achieved at 14% Sm. We will discuss the correlation between the polarization rotation, structural evolution and other properties as a function of chemical substitution.

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