

## Multiferroic phase diagram of Y partially substituted $\text{Dy}_{1-x}\text{Y}_x\text{MnO}_{3x}$

MnO<sub>3</sub> up to  $x=0.2$  on magnetism, specific heat, and ferroelectricity is investigated, which resulted in a preliminary

First, we identify the crystallinity of the DYMO samples by XRD patterns at room temperature, as shown in Fig. 1. The peaks suggest that the samples are well crystallized and can be indexed by single orthorhombic structure with space group  $Pbnm$

As mentioned above,  $T_{FE}$  signatures the Mn NSS ordering plus the induced Dy NSS ordering, which together result in nonzero  $P$ .<sup>8</sup> Since the induced Dy-spin order has the same propagation vector as that of the Mn order i.e.,  $\mathbf{M}^n$ , the symmetric exchange striction between the two spin sublat-