

## Optical spectroscopic investigations on multiferroic hexagonal $RMnO_3$ thin films

이윤상<sup>1\*</sup>, 최우석<sup>2</sup>, 노태원<sup>2</sup>

<sup>1</sup>승실대학교 물리학과

<sup>2</sup>서울대학교 물리천문학부 & ReCOE

Multiferroic oxides have taken a lot of interests due to their intrinsic coupling between magnetic and electric order parameters. Among the magnetoelectric materials, hexagonal  $RMnO_3$  (hexa- $RMnO_3$ ) compounds are characterized by their large ferroelectric polarization values and high ferroelectric transition temperature. To understand the mechanism of the magnetoelectric behavior in this multiferroics, it is quite useful to probe the charge-spin coupling and the related electronic properties by employing optical spectroscopic techniques. Motivated by this, we performed optical measurements of the hexa- $RMnO_3$  series with the variation of temperature and magnetic field. We found that the interband transitions near 2.0 eV are quite sensitive to the magnetic transition and also the application of the magnetic field. Combined with the first-principle calculation result, these intriguing electronic responses are discussed in relation to the multiferroic properties in the hexa- $RMnO_3$ .