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Study Multiferroic/Magnetoelectric Materials using Inelastic Neutron Scattering Technique

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Multiferroic and magnetoelectric materials have been extensively studied in the past two decades due to their interesting properties and potential versatile applications. Magnetoelectric coupling is the fundamental mechanism of multiferroic and magnetoelectric properties in these materials. However, understanding magnetoelectric coupling mechanisms in these materials is a challenging task. Magnetoelectric coupling mechanisms are highly dependent on magnetic structures and spin dynamics. Neutron diffraction and inelastic neutron scattering are powerful tools to study these materials to reveal their hidden magnetoelectric coupling mechanism. Spin dynamics of multiferroic/magnetoelectric materials such as $TbMnO_3$,[1] $BiFeO_3$,[2] $Co_4Nb_2O_9$[3,4]/$Mn_4Nb_2O_9$[5] have been intensively investigated using the inelastic neutron scattering technique. The results from these studies significantly improve our understanding to the magnetoelectric coupling mechanism in these complicated multiferroic systems. All these studies evidence that inelastic neutron scattering technique is an indispensable tool to study the microscopic mechanism of magnetoelectric coupling in various multiferroic/magnetoelectric systems. The thermal-neutron triple-axis spectrometer Taipan[6] and the cold-neutron triple-axis spectrometer Sika[7] at Australian Centre for Neutron Scattering (ACNS) are powerful tools to conduct inelastic neutron scattering studies of condensed matters including multiferroic materials.

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Topics

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