5th International Conference and Expo on

Ceramics and Composite Materials

June 03-04, 2019 | London, UK

The antiferroelectricity in (Pb,Ca,Sr)TiO_3 ceramics

Liuyang HAN[1, 2]

[1]IEMN-DOAE-Universite Polytechnique Hauts-de-France, France

[2]Shanghai Institute of Ceramics-CAS, China

Antiferroelectrics (AFEs), as an important group of dielectric materials, are extremely attractive for the applications of high energy-storage capacitors, digital displacement transducers, pulsed power generators and so on. The efforts to searching for new AFE system have never stopped. The study demonstrates the existence of antiferroelectricity in $Pb_xCa_ySr_zTiO_3$ (PCST100x/100y/100z, x+y+z=1) solid solutions, and their composition-structure-property relationships are firstly determined in this work. The solid solutions of $Pb_xCa_ySr_zTiO_3$ were synthesized by solid-state reaction in the form of ceramic, and transmission electron microscopy (TEM) studies, dielectric and ferroelectric properties and phase transition behaviors of PCST have been carried out. The presence of satellite reflections related to incommensurate modulation of A-site and Ti cations antiparallel displacement wave, corresponding to the phase where double ferroelectric hysteresis loops were observed, manifests the existence of antiferroelectricity. On the other hand, the composition, temperature and isostatic pressure induced phase transitions sequences in PCST ceramics have accordingly revealed the antiferroelectric phase evolution. An empirical diagram of average electronegativity difference versus tolerance factor here presents a predictive crystal-chemical model and clarifies composition-structure-properties relations for PCST systems. The comprehensive study of PCST provides a new system of antiferroelectric (AFE) materials and gives us a referential concept to design AFE materials.

hanliuyang@student.sic.ac.cn