

Investigation of Barium Titanate Posistor Ceramics

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Abstract

INVESTIGATION OF BARIUM TITANATE POSISTOR CERAMICS BY ESR METHOD

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Barium titanate ceramics doped by various ions is widely applied in modern technique. One of the unique properties of BaTiO₃ ceramics is positive temperature coefficient of resistance (PTCR) effect, which strongly depends on type of impurity ions and their position in the crystal lattice. In this work we performed the study of impurity centers, electrical resistivity and microstructure of BaTiO₃ ceramics doped with Nb, Ta, Mo or W ions in a wide range of concentrations. Electron spin resonance, X-ray diffraction and electron microscopy methods have been used for measurements. It was shown that grain size of BaTiO₃ ceramics became smaller under Ta or Nb doping though the temperature region of the effect of positive temperature coefficient of resistivity remains practically unchanged. For exact identification of paramagnetic centers observed in ceramic samples, ESR studies of BaTiO₃ single crystals were carry out as well. The observed correlation between ESR intensity and conductivity allowed us to assume an essential role of the revealed paramagnetic complexes in the appearance of semiconducting properties in BaTiO₃ ceramics. The influence of the impurities on the PTCR effect observed in BaTiO₃ ceramics is discussed.