169. Effect of Ho-ion implantation on the defect structure of barium titanate ceramics

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Abstract: Defect structure and diffusion characteristics were evaluated in barium titanate ceramics where Ho ions were implanted with an accelerating voltage of 500 keV. The depth profile of the ions was divided into three layers in the post-annealed sample, the first was the precipitation region, the second layer was created by lattice diffusion of Ho ions, and the last layer was created by grain boundary diffusion. The Ho lattice diffusion characteristics were similar to Ni ion diffusion in barium titanate ceramics, and we concluded that the diffusion mechanism was the same as that responsible for Ni ions. The Ho ions diffused through the B-site (Ti-site), and were then exchanged with A-site ions. This mechanism suggests that a small number of Ho ions dissolved in the B-site. Preferential grain boundary diffusion was also observed. The grain boundary diffusion coefficients were four to five orders of magnitude larger than the volume diffusion coefficients. The solubility of Ho ion was estimated to be a few thousand ppm in the barium titanate ceramics.