

カソードルミネッセンス法による SrTiO_3 の酸素欠損評価

Cathodoluminescence Study of Oxygen Defects in SrTiO_3

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Oxygen related defects in oxide materials are of great importance for the performance of oxide-based electronic devices. For instance, the resistive switching in many oxides has been attributed to the presence of oxygen vacancies. In this study, we will demonstrate the characterization of oxygen related defects in SrTiO_3 based on cathodoluminescence (CL) method. Figure 1 showed CL spectrums of SrTiO_3 samples undergone vacuum or air annealing. A broad visible emission with peak center around 445 nm was observed in both cases. However, there was significant difference in the luminescence intensity, that it was suppressed by air annealing while enhanced by vacuum annealing. Similar spectra has been reported in the photoluminescence (PL) of Ar^+ -irradiated SrTiO_3 and the origin of the blue emission was due to the recombination process via in-gap defect levels localized at oxygen vacancies [1].

Our CL results clearly show that the concentration of oxygen vacancies can be adjusted by annealing conditions. A systematical CL study of SrTiO_3 crystals of different orientations and doping conditions will be presented.

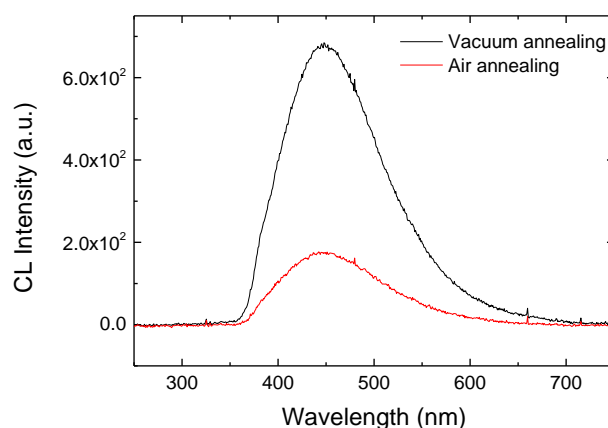


Fig. 1 Room temperature CL spectrums of SrTiO_3 undergone vacuum annealing or air annealing.

Reference

- [1] D. Kan et al, "Blue-light emission at room temperature from Ar^+ -irradiated SrTiO_3 ", Nature Materials 4 (2005) 816-819.