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Blue-light emission at room temperature from Ar^+-irradiated $SrTiO_3$ DAISUKE KAN, Institute for Chemical Research, Kyoto University, TAKAHITO TERASHIMA, Research Center for Low Temperature and Materials Sciences, Kyoto University, RYOKO KANDA, ATSUNOBU MASUNO, Institute for Chemical Research, Kyoto University, ATSUSHI ISHIZUMI, Graduate School of Material Science, Nara Institute of Science and Technology, YOSHIHIKO KANEMITSU, YUICHI SHIMAKAWA, MIKIO TAKANO, Institute for Chemical Research, Kyoto University — $SrTiO_3$ is a key material for fabricating oxide-based electronic devices. We found that Ar^+-irradiated, metallic $SrTiO_3$ crystals emit 430-nm blue-light at room temperature. Oxygen-deficient metallic $SrTiO_3$ thin films also show the blue-light emission. Reciprocal mapping using synchrotron x-ray radiation at SPring-8 reveals a slight elongation of the lattice parameter along the out-of-plane direction both for these samples. We, therefore, suggest that the Ar^+-irradiation introduces oxygen deficiency in the crystal surface, and that the deficiencies generate conduction carriers which wait ready for the recombination with photo-exited holes, and play an important role in the emission. It is emphasized that the emitting region could be patterned into any size and shape by combining conventional photolithography and Ar^+-milling. These new features of $SrTiO_3$ will open up new possibilities for the oxide-based electronic devices.

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