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Persistent photoconductivity in strontium titanate[1] MATTHEW MCCLUSKEY, MARIANNE TARUN, Washington State University — Strontium titanate ($SrTiO_3$) is often used as a substrate for oxide thin films such as high-temperature superconductors. It has the perovskite structure and an indirect band gap of 3.25 eV. Our prior work showed that hydrogen impurities form a defect complex that contains two hydrogen atoms. The complex was tentatively attributed to a passivated strontium vacancy. Alternatively, it could be a partially passivated titanium vacancy. In order to suppress strontium vacancies (and create titanium vacancies), we annealed samples in an evacuated ampoule with SrO powder. These samples show unexpected behavior. After illuminating with light (405 nm, 3.06 eV), the free-electron concentration increases significantly. After the light is turned off, the high conductivity persists at room temperature. We tentatively attribute this effect to the excitation of an electron from a titanium vacancy into the conduction band, with a high barrier for recapture.

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