

Abstract Submitted
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Hydrogen in Insulating Oxides DAVID WINARSKI, F.A. SELIM,
Bowling Green State University — Hydrogen is known to strongly affect the structural and electrical properties of many materials. Its effects have been extensively investigated in semiconductors, theoretically and experimentally. However, no attention has been paid to the role of hydrogen in insulators. In this work we show that hydrogen has profound effects on the optical properties of $\text{Y}_3\text{Al}_5\text{O}_{12}$ insulating oxide, an important photonic material with wide range of applications in laser, scintillation and illumination. Thermo-luminescence measurements were carried out from 77 K-675 K on undoped $\text{Y}_3\text{Al}_5\text{O}_{12}$ single crystals. The measurements showed that hydrogen eliminates most of the deep and shallow traps in $\text{Y}_3\text{Al}_5\text{O}_{12}$ single crystals and dramatically affect the luminescence and scintillation properties of the crystals. These effects are explained due to the recently discovered phenomena, passivation of cation vacancies by hydrogen [Phys. Rev. B 88, 174102, 2013].

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