

Poster Presentation

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X-Ray induced Photostriction in Bismuth Ferrite

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In a material with both a piezoelectric effect and the capability to form a photocurrent, photostriction can be observed – the deformation of the crystal by light. When studying photostriction, a potential method is to use x-rays to probe the unit cell in response to another light source as a stimulus, such as a laser or a diode. Given that x-rays are also photons it is plausible that they themselves produce some effect. An experiment was carried out to investigate how significant the effects of the x-rays are in producing photostriction in the absence of any other source of illumination. The material studied in this example was bismuth iron oxide, BiFeO₃. A thin film with electrodes was used and it was found that the photocurrent generated by a laboratory x-ray source on the sample was of comparable level to that of a laser or diode used in the study of the bulk photoelectric effect. Using a novel, time dependent crystallographic approach, the intrinsic effect of synchrotron x-ray light on a photoferroelectric thin film has been investigated. Furthermore, we have simultaneously collected diffraction and photoelectric data, and the correlation between the electronic and structural properties will be discussed. These results could suggest that caution is necessary when interpreting photostriction data obtained with the use of x-rays.

Keywords: Photostriction, X-rays, Bismuth Ferrite