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Oxygen ordering and electrochromism in Ca-doped $BiFeO_3$[1] JAN SEIDEL, Lawrence Berkeley National Laboratory, Berkeley, CA, WEIDONG LUO, Vanderbilt University, Nashville, TN and ORNL, Oak Ridge, TN, PHI NGUYEN, Rutgers University, Piscataway, NJ, SURESHA SIRIYARA JAGANNATHA, ALAN LEE, SANG-YONG KIM, Lawrence Berkeley National Laboratory, Berkeley, CA, CHAN-HO YANG, KAIST, Daejeon, Republic of Korea, STEPHEN PENNYCOOK, SOKRATES PANTELIDES, Vanderbilt University, Nashville, TN and ORNL, Oak Ridge, TN, RAMAMOORTHY RAMESH, Lawrence Berkeley National Laboratory, Berkeley, CA — We show that calcium-doped bismuth ferrite thin films exhibit an electrochromic effect arising from an intrinsic mechanism due to redistribution of carriers, without the need for additional electrolytes that are needed in common electrochromic devices. The absorption change and coloration efficiency at the band edge are $4.8 \times 10^6 m^{-1}$and $190 cm^2 C^{-1}$, respectively, which are among the highest reported values for inorganic electrochromes. These experimental findings are supported by optical absorption calculations from first-principles theory, confirming the strong absorption change at the band edge.

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