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Ferroelectricity and hysterically controlled photocurrent in $NaMnF_3$ Thin Film[1] MING YANG, AMIT KC, PAVEL BORISOV, DAVID LEDERMAN, ALDO ROMERO, CHENG CEN, West Virginia Univ — Abstract: In recent year many fascinating electron correlation phenomena have been discussed, such as two dimensional electron gas, metal-insulator transitions and multiferroic interactions. While most of the researches concentrate on complex oxides, there are strong indications that complex fluorides may have analogous, or even enhanced properties. $NaMnF_3$ is one such example. Theoretical work predicted that $NaMnF_3$ has multiferroic characters and strong magneto-electric coupling. Thin films of $NaMnF_3$ with 50 nm thickness were grown on $SrTiO_3$ substrates via molecular beam epitaxy. By performing piezoelectric force microscopy, rewritable polarizations were manipulated and stable ferroelectric switching was obtained in $NaMnF_3$ at room temperature. At low temperatures, persistent photocurrent was observed under the illumination of 400nm laser. Amplitude and direction of such photocurrent can be hysterically controlled by external biases. This phenomenon is due to the fact that photocarriers generated in $SrTiO_3$ are driven by the controlled built-in electric field in $NaMnF_3$ thin film. These findings indicate great potential of complex fluorides in applications such as ferroelectric switches, photovoltaic devices and memory storages. This work is supported by DMREF-NSF 1434897.

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