Supporting Information

(K,Na)NbO$_3$ ferroelectrics: A new class of solid-state photochromic materials with reversible luminescence switching behavior

Haiqin Sun, Jian Liu, Xusheng Wang, Qiwei Zhang, Xihong Hao, and Shengli An

a Inner Mongolia Key Laboratory of Ferroelectric-related New Energy Materials and Devices, School of Materials and Metallurgy, Inner Mongolia University of Science and Technology, 7# Arding Street, Kun District, Baotou 014010, China

b Functional Materials Research Laboratory, School of Materials Science and Engineering, Tongji University, 4800 Caoyang Road, Shanghai 201804, China

*E-mail: zqw8000@imust.edu.cn
Fig. S1 Grain size distribution of KNN:0.01Sm samples sintered at different temperatures: (a) 1020 °C, (b) 1040 °C, (c) 1060 °C, (d) 1070 °C, (e) 1080 °C, and (f) 1100 °C.

Fig. S2 Elemental mapping of K, Na, Nb, O, and Sm for KNN:0.01Sm ceramics sintered at 1080 °C
**Fig. S3** Excitation ($\lambda_{em}=599$ nm) and emission spectra ($\lambda_{ex}=406$ nm) for KNN:0.01Sm ceramics sintered at 1080 °C.

**Fig. S4** Reflective spectrum of pure KNN sintered at 1070 °C for 2 h. The inset is the absorption spectrum converted by a K-M function, the dotted line to the horizontal axis indicates a band gap ($E_g$).
Fig. S5 The absorption changes (ΔAbs) for KNN:0.01Sm ceramics sintered at various sintering temperatures.