Localized Crystallization: A Chemical Transformation of Nb$_2$O$_5$ Rod-Like Arrays into Ordered Niobate Arrays

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**Fig. S1.** TEM image of a NaNb$_3$O$_8$ microtube showing that the wall is porous.
**Fig. S2.** The side view of NaNb$_3$O$_8$ microtubes without (a) and with (b) top caps.
Fig. S3. EDX spectra of the core/shell structures emphasizing the compositional difference of Nb$_2$O$_5$ core (a) and NaNb$_3$O$_8$ shell (b).
Fig. S4. (a) Quick dissolution process results in poor structural strength of the thin shells collapse. (b) Slow dissolution process renders the growth of NaNb$_2$O$_8$ in nanoscale voids and the shells become thick, restraining hollowing process. The NH$_4$F concentration was a) 1.8 M and b) 1.0 M.
**Fig. S5.** SEM images of sodium niobate thin film produced without the addition of NH$_4$F.
**Fig. S6.** SEM images of broken NaNbO$_3$ hierarchical microrods from A-Sample Nb$_2$O$_5$. 
Fig. S7. A cross section image of the free-standing KNMT thin film.
Fig. S8. XRD pattern of the as-obtained KNMT arrays showing that it is completely identical to K$_2$Ta$_2$O$_6$ (JCPDS Card No. 35-1464), which indicating the resemblance of the crystal structure. The peaks labeled with black triangles correspond to the diffraction peak of Nb substrate.
Fig. S9. EDX pattern for the as-obtained KNMT.
Fig. S10. SEM images of potassium niobate thin film produced at lower KOH concentration (0.15–0.25 M) with other reaction conditions unchanged.