Synthesis of Pure and Mn-doped $LiNbO_3$ Nanofibers by Electrospinning

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Electrospinning is a powerful technique to synthesize polymeric and ceramic fibers [1-3].
In this work, pure and Mn-doped $LiNbO_3$ nanofibers were synthesized by the electrospinning method, followed by a heat treatment. Niobium ethoxide Nb(OCH2CH3)5), lithium hydroxide (LiOH), manganese acetate $Mn(C_2H_3O_2)_2$ and polyvinylpyrrolidone (PVP), were dissolved in ethanol C_2H_5OH to obtain the precursor solution. This solution was delivered into a metallic needle at a constant flow rate of 0.3 mL/h by a syringe pump. The metallic needle was connected to a high-voltage power supply and a grounded aluminum foil was placed 15 cm from the needle tip, where the as-spun composite is collected [4-6].
In order to determine the annealing temperature to reach the desired LiNbO3 and $LiNb_{1-x}Mn_xO_3$ compounds, the thermal stability of as-spun composites were analyzed by thermogravimetry-differential scanning calorimetry (TGA–DSC). Morphology and microstructural characterization of calcined nanofibers were performed by X-ray diffraction (XRD) measurements, Field-emission scanning electron microscopy (FESEM) and High-Resolution Transmission Electron Microscopy (HRTEM). Further material identification was conducted by acquiring Raman spectra.
Pure and Mn-doped $LiNbO_3$ nanofibers have been successfully prepared by electrospinning process followed by calcination at 700 ˚C for 2 h, showing a length of few μm and formed by irregular shaped nanoparticles with size between 40 and120 nm.

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