

SYNTHESIS OF LITHIUM NIOBATE-SILICA NANOFIBERS

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Recently, there has been an intense research effort on electrospinning of ceramics, we were not able to find many reports on the synthesis of lithium niobate nanofibers by electrospinning. Precursor concentration is a crucial parameter for the efficient preparation of fibers by electrospinning and sol gel because it affects viscosity and surface tension. In the specific case of ceramics, it has been reported that characteristics like diameter, grain growth rate, and sinterability are influenced by concentration values. Lithium niobate-silica fibers were produced by the combination of the sol-gel method and the electrospinning technique. Two sol-gel solutions starting from niobium-lithium ethoxide and tetraethyl orthosilicate were prepared and then mixed with polyvinylpyrrolidone; the solutions were electrospun in a coaxial setup. The obtained lithium niobate-silica polymeric fibers were approximately 760 nm in diameter. Raman spectroscopy confirmed the composite composition by showing signals corresponding to lithium niobate and silica. Scanning electron microscopy showed coaxial fibers with a diameter of around 330 nm arranged as a fibrillar membrane at 800 °C. At 1000 °C the continuous shape of fibers was preserved; the structure is composed of silica and lithium niobate nanoparticles within the fibers. The formation of crystalline lithium niobate and amorphous SiO₂ phase was also confirmed by XRD peaks.

Keywords: lithium niobate-silica, polymeric fibers, electrospinning

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