

Abstract Submitted
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Fabrication of lithium niobate for three wave mixing, quantum information and communications MATTHEW MIRCOVICH, University of Dayton — Lithium Niobate (LN) is a crystal that has applications in nonlinear optics. Poling LN crystals allows quasi phase matching and three wave mixing to be achieved while allowing crystals to be longer without incurring a phase-mismatch penalty. Periodically Poled Lithium Niobate (PPLN) has a high degree of effective nonlinearity due to the increased interaction length. Fabrication of PPLN crystals starts from a Lithium Niobate wafer doped with MgO. The wafer is periodically patterned with photoresist, then placed inside a conductive electrolyte solution. A high voltage is applied through the solution, contacting the wafer where the resist is absent. A 3-5 kV pulse is applied through the electrolyte, causing a domain reversal between the photoresist, leading to periodic poling. An alternative fabrication process of PPLN involves the wafer periodically patterned with electrodes and placed in a dielectric oil bath held at a constant temperature. The fabrication of PPLN will be explored using various voltages, temperatures and periods. The fabricated structures will be tested in frequency upconversion and downconversion experiments for quantum information and communication applications.

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