Thin-Film Lithium Niobate and a Method of Producing It

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method of growing thin, ferroelectric films of lithium niobate, which are easily etched by chemical, kinetic or optical processes.

OVERVIEW

Ferroelectric materials, such as crystalline lithium niobate, are very useful for fabricating a variety of optical and electronic devices, including optical switches and modulators, frequency switching devices, polarized controllers, pulsed waveguide lasers, surface-acoustic-wave filters and acousto-optic devices. Other useful properties of these materials include their piezoelectric, elasto-optic and pyroelectric characteristics.

Lithium niobate-based devices are typically manufactured from bulk crystal material – usually a wafer about 0.5 to 1 mm thick – even though the devices use only a small fraction of the material’s surface volume. As an alternative, scientists have attempted to produce thin films of crystalline lithium niobate; however, in its crystalline state this material etches extremely slowly.

THE INVENTION

UW-Madison researchers have developed a method of growing thin, ferroelectric films of lithium niobate, which are easily etched by chemical, kinetic or optical processes. First, a uniform, amorphous, thin film of lithium niobate is grown on a substrate. Unlike the material in its crystalline state, amorphous lithium niobate is easily patterned by conventional photolithography and etched by wet or dry etchants. After etching, the remaining film can be annealed to its crystalline form, providing a material suitable for optical and electronic applications.

APPLICATIONS

• Optical and electronic devices
KEY BENEFITS

• Provides a technique for creating crystalline thin films of lithium niobate that are easily patterned and etched

ADDITIONAL INFORMATION

Related Technologies
See WARF reference number P02184US for lithium niobate-based, electro-optic elements for use in electro-optic devices.

Tech Fields
Materials & Chemicals - Metals

CONTACT INFORMATION

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846.