THESIS **DEFENSE**

Chloe Cook: M.S. Candidate

DEVELOPMENT OF CHEMICAL SOLUTION DEPOSITED LEAD ZIRCONATE TITANATE FERROELECTRIC THIN FILMS FOR NON-PLANAR SUBSTRATES

November 1, 2019
11:00AM
HH300

Abstract: This thesis focuses on the development of a technique to deposit chemical solution derived thin films of the ferroelectric material lead zirconate titanate (PZT) onto non-planar substrates. PZT is a widely researched ferroelectric material for many thin film applications due to the magnitude of its dielectric, ferroelectric and piezoelectric properties. Chemical solution deposition (CSD) is a low cost, low capital method of depositing thin films which also allows for intimate mixing of precursors, leading to homogeneous final films. Applying CSD methods to non-planar substrates would allow for these quality films to be deposited on the three-dimensional structures which make up many devices that implement ferroelectric materials.

Ferroelectric PZT films were fabricated through a chelate route and deposited through both spin coating and dip coating methods. Conductive lanthanum nickelate (LNO) thin films were successfully created through a CSD method to be used as a bottom electrode for the PZT films. The PZT and LNO films on flat substrates were characterized through various techniques to verify their quality. Once quality films were achieved, the films could be applied to non-planar substrates.

Various methods of depositing chemical solution derived films onto non-planar substrates were explored and developed to account for specific material, size and processing constraints. The processes were optimized to deposit ferroelectric PZT films onto a specific silicon wedge substrate. Electron microscopy revealed that the techniques allowed for a successful deposition of the films onto the wedge substrate. These techniques could be applied to various non-planar substrates with similar constraints.

ADVISORS
Dr. Geoff Brennecka

COMMITTEE
Dr. Meenakshi Singh
Dr. Ivar Reimanis

COLORADOSCHOOLOFMINES
EARTH • ENERGY • ENVIRONMENT

MATERIALS SCIENCE INTERDISCIPLINARY PROGRAM