

## What our lab does:

- New methods of processing/fabricating oxide and chalcogenide glasses with enhanced functionality and/or performance
- We characterize structure, properties and performance under realistic and accelerated conditions
- Our in-house glass making expertise gives us flexibility in designing new compositions, and a detailed knowledge of prior history that may affect properties

## How we do this:

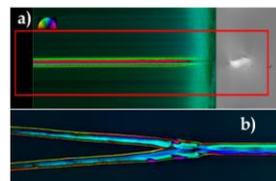
- Glasses are made by classic melt-quench, modified sol-gel, and physical vapor deposition methods
- Physical, chemical and vibrational structures are determined by advanced electron microscopy, X-ray absorption, X-ray photoelectron, Raman and infrared spectroscopies → All using state of the art techniques

## Why we are investigating this area:

- Structuring and understanding glass down to atomic scale allows us to make materials with *exceptional properties* and metastructures with *new functionality*.
- Applications: Optically active 3D single crystal waveguides in a glass; lattice engineered metamaterials for photonics/quantum communication; tailored amorphous multi-porous bioactive structures for tissue regeneration; inorganic resists for grayscale lithography for MEMS/NEMS devices; etc.

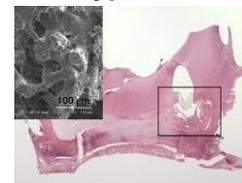
## Develop, fabricate, & characterize glass materials with enhanced *functionality & performance*

### World's first active single crystal 3D waveguide in glass



[doi.org/10.1038/srep10391](https://doi.org/10.1038/srep10391)

### Novel nano-macro porous powder for pulp capping & dental hypersensitivity



[doi.org/10.1016/j.jdent.2021.103655](https://doi.org/10.1016/j.jdent.2021.103655)

### Lattice engineered crystals in glass



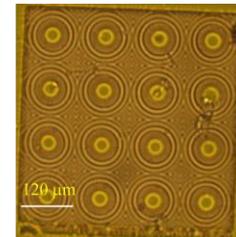
[doi.org/10.1364/OME.462724](https://doi.org/10.1364/OME.462724)

### Complex corrosion of wineglass\*



[\\*doi.org/10.1111/j.1151-2916.2003.tb03538.x](https://doi.org/10.1111/j.1151-2916.2003.tb03538.x)

### Array of thinnest Fresnel microlenses in glass thin film



[doi.org/10.1117/1.3273966](https://doi.org/10.1117/1.3273966)