

Case ID:M21-044L

Published: 9/13/2021

## Inventors

**Christopher Miranda**

**Barbara Smith**

## Contact

Jovan Heusser  
jovan.heusser@skysonginnovations.com

# Non-contact, All Optical, Photoacoustic Microscopy

### Invention Description

Photoacoustic microscopy (PAM), the imaging technique that generates acoustic waves caused by thermal expansion due to optical absorption, has been successfully utilized to provide absorption-based contrast at unparalleled depths. Recent advancements in PAM have enabled contrast-free image reconstructions of subcellular components with exceptional resolution. However, traditional PAM techniques still require a transducer to be in direct contact with the sample or a coupling medium to enable signal acquisition. This leads to poor translation into clinical applications.

Researchers at Arizona State University have developed an unprecedented new form of non-contact, all-optical PAM technology for precisely mapping tissue biomechanics. This technology enables the biomechanical properties of cells and tissues to be measured with sub-micron diffraction-limited resolution without the need for a transducer or coupling medium. Utilization of this non-contact PAM technology provides for mechanobiology interrogations at greater tissue depths with dramatically reduced signal acquisition times, improving the feasibility for clinical applications.

This technology could be a superior non-contact method of optical detection of the photoacoustic effect, enabling the next generation of PAM.

### Potential Applications

- Clinical tool for imaging and measuring biomechanical properties of selected cells and tissues
  - Diagnostic tool in ophthalmology (keratoconus, myopia, etc.)
- Research tool for mechanobiology tissue and cellular investigations

### Benefits and Advantages

- Does not require transducer in contact with the sample or a coupling medium
- Can determine biomechanical properties of the cornea non-invasively
- Dramatically reduced imaging time
- May enable submicron-resolution intracellular imaging of molecules
- Contrast free – DNA, RNA, the cytoplasm, and myelin sheath have strong absorption peaks in the UV, visible and NIR range and can act as endogenous chromophores
- Increases clinical translation of PAM

For more information about the inventor(s) and their research, please see

[Dr. Smith's departmental webpage](#)