

# Phase-Change Contrast Agent for use in Diagnostic Ultrasound Imaging

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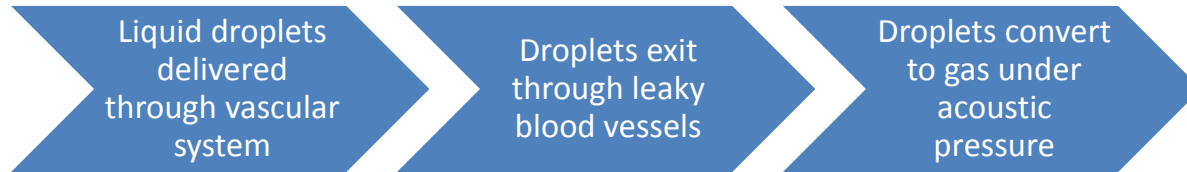
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# Contrast-Enhanced Ultrasound Imaging

- Microbubble contrast agents can be used with ultrasound imaging to enhance cell tracking and molecular imaging making it possible to detect a range of illnesses earlier
- Applications include functional tumor, kidney, and liver imaging
- Clinical Problem: due to the size of microbubbles they are unable to exit blood vessels to provide contrast outside of the vascular system

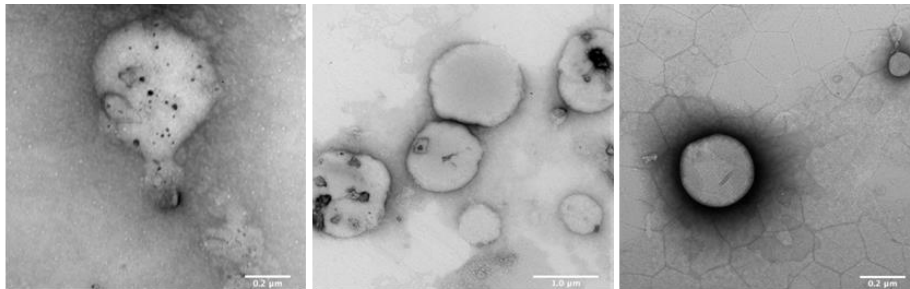
# A Novel Phase-Change Contrast Agent

- Phase-change contrast agents



- Current Limitations
  - Low boiling point → less stable, spontaneously convert from liquid to gas
  - High boiling point → more stable, require acoustic pressure above clinical limit
- Solution: UVA researchers have optimized perfluorocarbon droplet synthesis for diagnostic ultrasound applications by integrating nanoparticles in the phase-change contrast agent

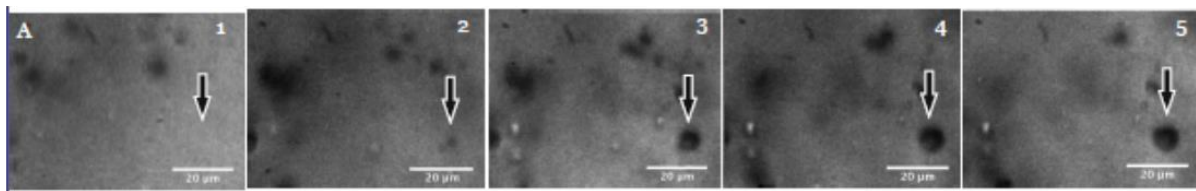
# Liquid Droplets Containing Nanoparticles



Droplets containing nanoparticles

Droplets with aggregated nanoparticles

Control droplets without nanoparticles



High speed camera images demonstrating conversion of perfluorocarbon droplets with nanoparticles from liquid to gas phase. Note: the arrow shows the formation of a single bubble from a droplet precursor. Each frame was captured in 100 ns.

# Intellectual Property

- UVA TechID: HOSSACK-DROPLET (2016-047)
  - Title: Methods and apparatus for cell tracking and molecular imaging
  - US Patent Application 15/729,164 filed October 10, 2017

