Novel Biosensor for Clinical Assessment of Chronic Wounds
Chronic Wound Care

• The cost of managing chronic wounds in the US exceeds $20 Billion per year\(^1\)

• 6.5 million patients suffer from chronic wounds annually\(^1\)
  – 40% Pressure injuries (ulcers)
  – 10% Venous leg ulcers
  – 50% Diabetic foot wounds
    • Recurrence rate of diabetic foot ulcer is 66%

• Clinical Problem:
  – Oxygen is required within a wound to promote healing and is therefore a critical factor in determining the course of treatment for a chronic wound.
  – Current standards of care for assessing wound healing rely on subjective analysis of images or indirect measures of oxygen within the surrounding tissues.

Oxygen-sensing Film for Chronic Wound Care

Solution: Researchers at the University of Virginia have developed a novel oxygen-sensing material capable of providing a direct readout of the amount of oxygen that is in the wound itself to aid clinicians.

- See beyond what the eye can see
- Reliably measure outcomes
- Mitigate risks early
This patented dual-emissive material is ideal for ratiometric oxygen sensing. The blue fluorescence signal serves as a standard and the yellow phosphorescence signal increases as oxygen levels decrease. The material is available as a film, fiber, powder or nanoparticle.
Reliably Measure Outcomes

The oxygen-sensing technology quantifies wound characteristics that cannot be seen by the eye or with standard camera imaging. With oxygen imaging, wound healing can be visualized within the 1st month after treatment which is not seen with standard camera imaging.

Oxygen-sensing technology substantiates the Tx (i.e. “pay for performance”)
Guide Treatment Decisions & Timing

Example scenario illustrated with murine images

Oxygen-sensing technology justifies surgery to prevent amputation (i.e. “pay for prevention”)

Oxygen-sensing enables earlier identification of wounds without sufficient oxygenation that cannot be seen in standard camera imaging and provides quantitative data to support treatment decisions.
Intellectual Property

• UVA TechID: FRASER-BORON (2006-141)
  – Title: Luminescent Diketonate Polymers

• UVA TechID: FRASER-CAMERA (2016-084) and
  – Title: Oxygen Sensing Difluoroboron B-Diketone Polylactide Materials for Wound Imaging

• UVA TechID: FRASER-CAMERA2 (2017-054)
  – Title: Oxygen Sensing Difluoroboron β-Diketone Polylactide Materials with Tunable Dynamic Ranges for Wound Imaging
Relevant Publications

Oxygen sensing difluoroboron β-diketonate polylactide materials with tunable dynamic ranges for wound imaging
DeRosa CA, Seaman SA, Mathew AS, Gorick CM, Fan Z, Demas JN, Peirce SM, Fraser CL.

Difluoroboron β-diketonate materials with long-lived phosphorescence enable lifetime based oxygen imaging with a portable cost effective camera
Mathew AS, DeRosa CA, Demas JN, Fraser CL