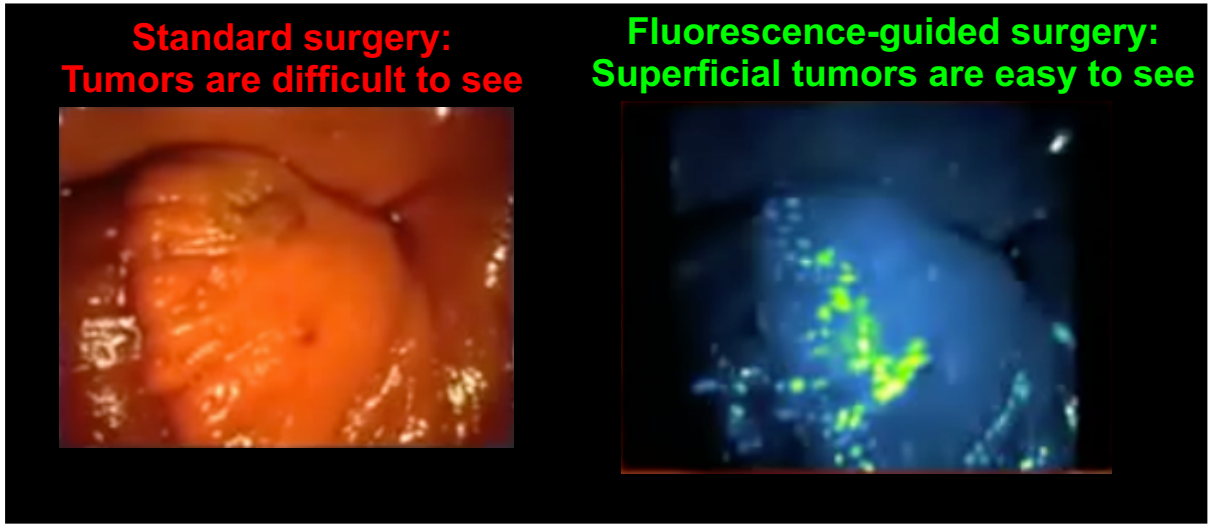
Project title

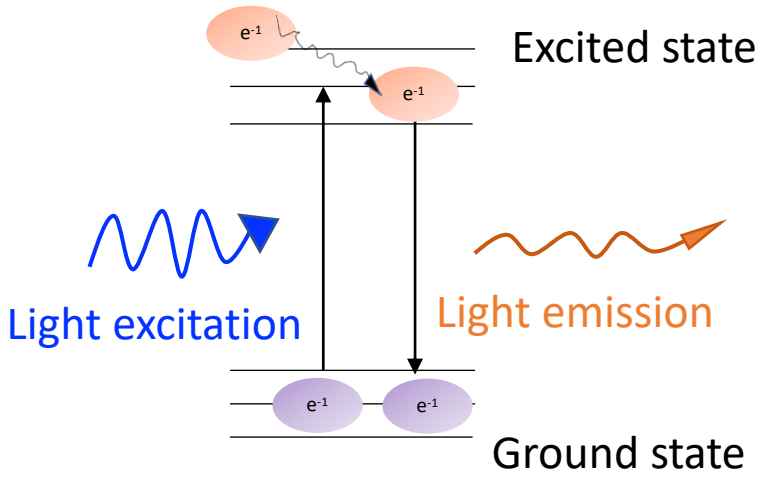
Advancing new technologies for improving cancer surgeries

Optical image-guided surgery



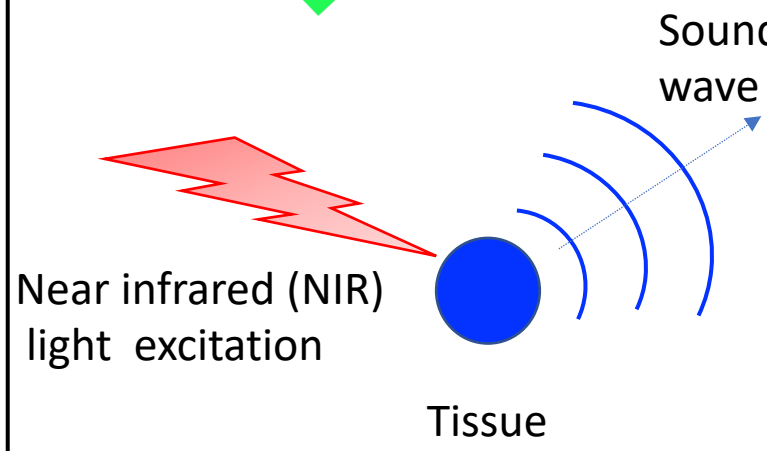
Optical imaging

Deep-tissue imaging ✗



Photoacoustic imaging

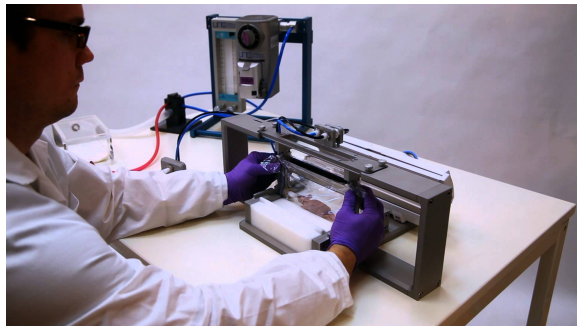
Deep-tissue imaging ✓



Sound waves travel farther without getting scattered, hence **photoacoustic imaging** can be used to visualize ***deep seated tumors in real time !***

Project Summary:

Develop photoacoustic probes for cancer diagnosis and therapy



The four steps of the project have been outlined below:

1. Development of molecular probes for targeted cancer imaging .

2. Validation of photoacoustic property of probes in solution (buffer) and within *in vitro* (cell lines) media

3. *In vivo* experiments: growing mice models, performing biodistribution studies and dynamic photoacoustic imaging with probes

4. Augmented surgery with *in situ* photodynamic therapy.

Photoacoustic imaging scanner

Major techniques/skills students will learn

- Design and synthesis of photoacoustic contrast agents for targeted cancer imaging
- Cell culture and in vitro assays
- Animal handling and development of mice tumor models
- Real time *in vivo* molecular imaging on a preclinical photoacoustic scanner
- Image data analysis using spectral unmixing algorithms
- Applying and understanding molecular imaging methods to solve biological/medical challenges
- Scientific interpretation of data sets from multiple disciplines and effective communication of the same.

Further reading

1. Sinharay S. et al. Prodigiosin analogue designed for metal coordination: Stable zinc and copper pyrrolyldipyrrins. Inorg. Chem. 2014, 53, 14, 7518–7526.
2. Weber J. et al. Contrast agents for molecular photoacoustic imaging. Nature Methods, 2016, 13, 639-650.
3. Luke GP. et al. Biomedical applications of photoacoustic imaging with exogenous contrast agents. Annals of Biomedical Engineering, 2012, 40, 422-437