

# Advanced Biophotonics Laboratory

## Biomedical Optics and its Applications

Assoc. Prof. Anna Yaroslavsky views microscope images with graduate students Cecil Joseph, left, and Dennis Wirth at the Advanced Biophotonics Laboratory.



Assoc. Prof. Anna Yaroslavsky recently joined the University's Physics Department where she directs its Advanced Biophotonics Laboratory. She is also a visiting associate professor of dermatology at Harvard Medical School, Massachusetts General Hospital and Wellman Center for Photomedicine.

The major focus of her research is on the structural and functional characterization of pathology. Other research directions she pursues in her laboratory include:

- Integration of multiple optical imaging and spectroscopic approaches (i.e., elastic scattering, polarization imaging, fluorescence and fluorescence polarization imaging and spectroscopy) to monitor biochemical and physiological processes in real time on spatially different scales;
- Modeling of light propagation in and interaction with biological tissues, liquids and cells;

- High-precision quantitative measurements of optical properties of tissues and liquids;
- Development of all-optical and multi-modal image-guided intervention techniques.

### Diagnosing Cancer at Optical Wavelengths

Recently, Yaroslavsky has developed a multispectral reflectance/fluorescence imaging technique that enables both wide-field and high-resolution imaging *in vivo* and in real time. The technique holds the potential to improve the diagnosis and treatment of malignancies, including, but not limited to, cancers of the skin, brain and breast.

The technique combines the ability of CCD macro imaging to rapidly inspect superficial tissue layers over large surfaces with confocal microscopy's ability to take images within turbid tissues at resolutions comparable to that of histology. The optical system can zoom in between these modes, allowing