8207F-120 Neurosurgical hand-held optical coherence tomography (OCT) forward-viewing probe
Saturday 21 January
Cuiru Sun, Ryerson Univ.; Kenneth Lee, Univ. of Toronto; Barry Vuong, Ryerson Univ.; Michael Cusimano, St. Michael's Hospital; Alexander Brukson, Adrian Mariampillai, Beau Standish, Ryerson Univ.; Victor Yang, Ryerson Univ and Univ. of Toronto
A prototype neurosurgical hand-held Optical Coherence Tomography (OCT) imaging probe has been developed to provide micron resolution cross-sectional images of subsurface tissue during open surgery. The probe has been designed based on electrostatically driven optical fibers and has been packaged with a Bayonet shaped handle. Optical properties of the probe has been optimized and characterized. Feasibility of this probe, in combination with a 1300 nm swept source OCT system was tested and images are demonstrated to highlight the usefulness of such a hand-held OCT imaging probe. The probe will be introduced into neurosurgical field for treatment guidance of neurological diseases.

8210-6 In vitro 3D tumor model-based screen of EtNBS derivatives to optimize PDT of hypoxic tumor environments
Saturday 21 January
Oliver Klein, Brijesh Bhayana, Wellman Ctr. for Photomedicine; Yong Jin Park, KAIST; Conor Evans, Wellman Ctr. for Photomedicine
Hypoxia is a major physiological treatment resistance mechanism that leads to substantially reduced therapeutic efficacy by protecting cells from normally cytotoxic molecules and treatment regimens. Photodynamic therapy using the photosensitizer EtNBS was previously found to be effective against hypoxic cells in an in vitro 3D model of metastatic ovarian cancer. To improve the capability of EtNBS-PDT, side-chain functionalized derivatives EtNBS were developed and screened using a multi-stage protocol ranging from subcellular localization to high-content cytotoxicity imaging of the entire 3D model. Optimal derivatives were additionally packaged in nanoparticles for studies investigating improved delivery and therapeutic efficacy.

8212-6 The potential of back-scattering interferometry for use in diagnostics
Saturday 21 January
Darryl Bornhop, Amanda Kussrow, Ian Olmsted, Carolyn Enders, Vanderbilt Univ.; David Cox, Arnold Castro, Ronald Ballard, Ctrs. for Disease Control and Prevention
The ability of BSI to perform fast, inexpensive, highly sensitive, label-free binding measurements using minimal sample makes the technique highly attractive as a potential diagnostic tool. BSI is a unique and universal platform technology which measures refractive index changes within a microfluidic channel. Femtomolar sensitivity and complex matrix compatibility sets BSI apart. We will show that BSI is Assay Agnostic, enabling detection schemes based on proteins and/or nucleic acids to virtually any molecule, without needing chemical derivatization of any kind. Our goal is to enhance the abilities to monitor therapeutic efficacy and to tailor treatments to individual patients.
8223-1 Fast deep-tissue multispectral optoacoustic tomography (MSOT) for preclinical imaging of cancer and cardiovascular disease
Sunday 22 January
Adrian Taruttis, Daniel Razansky, Vasilis Ntziachristos, Technische Univ. München and Helmholtz Zentrum München GmbH
Optoacoustic imaging has enabled the visualization of optical contrast at high resolutions in deep tissue. Our Multispectral optoacoustic tomography (MSOT) imaging results reveal internal tissue heterogeneity, for example in the case of tumor imaging, where the underlying distribution of fluorescent agents and oxy- and deoxyhemoglobin can be resolved in detail. Technical advances in cardiac imaging allow motion-resolved multispectral measurements of the heart, opening the way for studies of cardiovascular disease. We further demonstrate the fast characterization of the pharmacokinetic profiles of light-absorbing agents. Overall, our MSOT findings indicate new possibilities in high resolution imaging of functional and molecular parameters.

8230-1 Measuring intracellular motion using dynamic light scattering with optical coherence tomography in a mouse tumor model
Saturday 21 January
Golnaz Farhat, Univ. of Toronto; Adrian Mariampillai, Victor Yang, Ryerson Univ.; Gregory Czarnota, Sunnybrook Health Sciences Ctr.; Michael Kolios, Ryerson Univ.
We present for the first time an in vivo implementation of dynamic light scattering (DLS) adapted to optical coherence tomography (OCT). Gliosarcoma tumors were grown in dorsal skinfold window chambers fitted to female nude mice and imaged at a rate of 70 Hz using OCT. Speckle decorrelation times (DT) calculated at each pixel location indicated a significant difference between the tumor region and surrounding normal tissue. Preliminary results suggest the feasibility of using DLS-OCT to measure intracellular motion as an endogenous contrast mechanism in vivo.

8236-36 Guided resonances for light-assisted self-assembly and structural-absorption engineering
Monday 23 January
Michelle Povinelli, Camilo Mejia Prada, Chenxi Lin, Eric Jaquay, Luis Martinez Rodriguez, Univ. of Southern California; Avik Dutt, Indian Institute of Technology Kharagpur
We study the application of guided resonance modes in photonic crystals to two distinct applications: light-assisted self-assembly and structural absorption engineering. In the first case, we propose to use a photonic crystal as a template to assemble nanoparticles in regular crystalline patterns. The structured light fields above the photonic crystal form an array of optical traps to direct pattern formation. In the second case, we exploit guided resonances of silicon nanowire arrays to increase the absorption of a thin film, boosting photovoltaic efficiency. Further, we show that localized resonances of aperiodic structures can fulfill a similar function.

8247-10 Prospects for automated dissection and surgery with amplified ultrashort pulses of laser light
Sunday 22 January
David Kleinfeld, Univ. of California, San Diego
No abstract available.

8258-20 Reconfigurable visible quantum dot microlasers integrated on a silicon chip
Tuesday 24 January
Simin Mehrabani, Univ. of Southern California; Heather Hunt, Univ. of Missouri-Columbia; Andrea Armani, Univ. of Southern California
Developing on-chip, dynamically reconfigurable visible lasers that can be integrated with additional optical and electronic components will enable adaptive optical components. In the present work, we demonstrate a reconfigurable quantum dot laser based on an integrated silica ultrahigh-Q microcavity. By attaching the quantum dot using a reversible, non-destructive bioconjugation process, the ability to remove and replace it with an alternative quantum dot without damaging the underlying microcavity device has been demonstrated. As a result of the absorption/emission characteristics of quantum dots, the same laser source can be used to excite quantum dots with distinct emission wavelengths.

8269-61 Self-assembled plasmonic nanoclusters
Thursday 26 January
Jonathan Fan, Yu He, Harvard Univ.; Kui Bao, Rice Univ.; Chihhui Wu, Univ. of Texas at Austin; Jiming Bao, Univ. of Houston; Vinothan Manoharan, Harvard Univ.; Gennady Shvets, Univ. of Texas at Austin; Peter Nordlander, Rice Univ.; David Liu, Federico Capasso, Harvard Univ.
The self assembly of colloids is an alternative to top-down processing that enables the fabrication of a new class of nanophotonic structures. By tailoring the number and position of spheres in clusters, strong magnetic and Fano-like resonances emerge. Two assembly routes are explored: the capillary assembly of particles from droplets and cluster assembly via polymers. Polymers provide a flexible platform for tailoring the interaction between particles and programming the assembly of clusters into well-defined geometries. These types of clusters can be generalized to a broad range of functional nanostructures and serve as building blocks for novel metamaterials.

8270-26 Low loss silica on silicon integrated waveguides
Monday 23 January
Ashley Maker, Andrea Armani, Univ. of Southern California
We have developed novel silica on silicon waveguides with low optical loss and a unique suspended cylinder geometry. The waveguides are fabricated on silicon wafers using a combination of lithography, etching and laser reflow. The resulting smooth, cylindrical waveguides are isolated from the silicon substrate and are air-clad, maximizing the refractive index contrast and minimizing losses to the substrate. From the visible through the near-IR, we measured propagation losses of 0.7-0.9dB/cm and verified that the loss is independent of input power. With low loss and linear optical properties, these on-chip waveguides will benefit many applications, including biodetection and integrated optics.

8277-45 Mode locking and phase coherence in quantum cascade lasers
Wednesday 25 January
We present our recent theoretical and experimental results on mode locking, short pulse operation, and generation of frequency combs in mid-infrared quantum cascade lasers.

8278-5 High efficient semipolar LEDs with a small droop
Tuesday 24 January
Shuji Nakamura, Univ. of California, Santa Barbara
No abstract available.