

# Stanford

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## Idan Steinberg

Postdoctoral Research Fellow, Radiology

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#### BIO

Idan Steinberg received his B.Sc. (2008, with honors), M.Sc. (2011, with honors), and Ph.D. (2016) degrees in Biomedical Engineering from Tel Aviv University. He is currently a postdoctoral researcher in the Multimodality Molecular Imaging Lab (MMIL) of Dr. Sam Gambhir at Stanford University.

His M.Sc. research included both theoretical and experimental development of a magneto-acoustic system for early detection of tumors labeled with magnetic nanoparticles as well as the biomedical application of hollow-core waveguides. During his Ph.D., he focused on developing an innovative multispectral photoacoustic technique for the evaluation of bone pathologies, such as osteoporosis. This new technique can simultaneously measure bone functionality and biomechanical strength.

As a recipient of a Philips Fellowship Training Award, Idan is leading the development of photoacoustic and RF-acoustic transducers for Dr. Gambhir's Philips-supported research award of photoacoustic imaging of human prostate cancer. Those transducers are capable of performing both ultrasound imaging as well as molecular imaging of targeted agents. His work includes writing simulations for designing those devices; developing parallel reconstruction algorithms; mechanical, optical, acoustic, and electromagnetic design and manufacturing of those devices, as well as clinical trials involving those.

Idan's long-term goals involve a research position in either academia or industry to continue his research efforts in advancing methodologies and clinical applications in biomedical optics and ultrasound.

#### HONORS AND AWARDS

- Philips Healthcare Fellowship Training Award, Philips Healthcare (2018)
- Hamalainen Pelican Postdoctoral Fellowship, Sir Peter Michael Foundation (2017 - 2020)
- Contingency Student Travel Grant Award, The International Society for Optical Engineering (SPIE) (2015)
- Space, Travel Scholarship for an International Conference or Workshops, Israeli Ministry of Science, Technology and Space (2015)
- Research grants titled: "Optical fiber sensors for ultrasonic detection and measurement", Israeli ministry of science, technology & space \ National program for applied science (2014-2017)
- Department of Physical Electronics, Best poster award - 1st place, Tel Aviv University (2014)
- Travel Scholarship for an International Conference or Workshops, Israeli Ministry of Science, Technology and Space (2014)
- Clore Scholars Program, Sir Charles Clore Israel Foundation (2013-2016)
- Research Grant title: "Multispectral photoacoustic method for the early detection of Osteoporosis", Israeli ministry of industry, trade & labor \ Kamin program for transnational research (2013-2015)
- Biophotonics graduate school - Best poster awards - 2nd Place, Biophotonics 13', Ven Sweden (2013)
- Contingency Student Travel Grant Award, The International Society for Optical Engineering (SPIE) (2013)
- SPIE student chapter opening event, Best poster award - 2nd place, Tel Aviv university (2013)

- Research Grant title: "A photoacoustic spectroscopy method for the early detection of Osteoporosis", The Ela Kodesz Institute for Medical engineering and physical sciences (2012)
- Biophysics Fellowship, The Raymond & Beverly Sackler Biophysics Prize (2011-2014)
- Outstanding teaching assistant, Tel Aviv University (2011)
- Troski Scholarship, Tel Aviv University (2011)
- Outstanding teaching assistant, Tel Aviv University (2010)
- Faculty award for outstanding MSc students in engineering, Tel Aviv University (2009)
- Faculty Scholarship, Tel Aviv University (2008)
- Faculty award for outstanding undergraduate student, Tel Aviv University (2008)

## PROFESSIONAL EDUCATION

- Doctor of Philosophy, Tel-Aviv University (2016)
- Ph.D, Tel Aviv University, faculty of engineering , Biomedical Engineering (2016)
- M.Sc (Magna cum Laude), Tel Aviv University, faculty of engineering , Biomedical Engineering (with Business Administration studies) (2010)
- B.Sc (Magna cum Laude), Biomedical Engineering , Tel Aviv University, faculty of engineering (2008)

## STANFORD ADVISORS

- Sanjiv Gambhir, Postdoctoral Faculty Sponsor
- Sanjiv Gambhir, Postdoctoral Research Mentor

## PATENTS

- Idan Steinberg, Lihi Shiloh , Haniel Gabai, Yacov Botsev, Meir Hahami and Avishay Eyal. "Israel Patent Application No. 62215052 Gated OFDR System", Sep 7, 2015
- Idan Steinberg, Avishay Eyal and Israel Gannot. "Israel Patent WO 2014118781 A1 Detection, diagnosis and monitoring of osteoporosis by a photo-acoustic method", Jan 31, 2013

## LINKS

- My personal page: [http://www.researchgate.net/profile/Idan\\_Steinberg](http://www.researchgate.net/profile/Idan_Steinberg)
- My lab website: <http://med.stanford.edu/mips/research/mmil.html>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

My current research is focused on developing non-ionizing and low cost medical technologies that reliably detect diagnose and monitor disease progression. I work at the interface of between Photonics, Acoustics, RF, Molecular Imaging, Medical Imaging and Biomedical Signal processing. Equal emphasis is on translating these technologies for pre-clinical and clinical applications in cancer and neurological diseases.

### LAB AFFILIATIONS

- Sanjiv Gambhir, Multimodality Molecular Imaging Lab (MMIL) (7/30/2018)

## Publications

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### PUBLICATIONS

- **Simultaneous transrectal ultrasound and photoacoustic human prostate imaging.** *Science translational medicine* Kothapalli, S., Sonn, G. A., Choe, J. W., Nikoozadeh, A., Bhuyan, A., Park, K. K., Cristman, P., Fan, R., Moini, A., Lee, B. C., Wu, J., Carver, T. E., Trivedi, et al 2019; 11 (507)

- **Photoacoustic clinical imaging.** *Photoacoustics*  
Steinberg, I., Huland, D. M., Vermesh, O., Frostig, H. E., Tummers, W. S., Gambhir, S. S.  
2019; 14: 77–98
- **First-in-Human Study of Bone Pathologies Using Low-Cost and Compact Dual-Wavelength Photoacoustic System** *IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS*  
Steinberg, I., Shiloh, L., Gannot, I., Eyal, A.  
2019; 25 (1)
- **Intraoperative Pancreatic Cancer Detection using Tumor-Specific Multimodality Molecular Imaging.** *Annals of surgical oncology*  
Tummers, W. S., Miller, S. E., Teraphongphom, N. T., Gomez, A., Steinberg, I., Huland, D. M., Hong, S., Kothapalli, S., Hasan, A., Ertsey, R., Bonsing, B. A., Vahrmeijer, A. L., Swijnenburg, et al  
2018; 25 (7): 1880–88
- **Emerging Intraoperative Imaging Modalities to Improve Surgical Precision.** *Molecular imaging and biology : MIB : the official publication of the Academy of Molecular Imaging*  
Alam, I. S., Steinberg, I., Vermesh, O., van den Berg, N. S., Rosenthal, E. L., van Dam, G. M., Ntziachristos, V., Gambhir, S. S., Hernot, S., Rogalla, S.  
2018
- **A Reconstruction Method for the Estimation of Temperatures of Multiple Sources Applied for Nanoparticle-Mediated Hyperthermia** *MOLECULES*  
Steinberg, I., Tamir, G., Gannot, I.  
2018; 23 (3)
- **Deep Tissue Imaging: Acoustic and Thermal Wave Propagation and Light Interactions in Tissues** *Deep Imaging in Tissue and Tissue-Like Media with Linear and Nonlinear Optics*  
Steinberg, I., Shoval, A., Balberg, M., Sheinfeld, A., Gannot, I.  
CRC Press.2017
- **Quantitative study of optical and mechanical bone status using multispectral photoacoustics.** *Journal of biophotonics*  
Steinberg, I., Turko, N., Levi, O., Gannot, I., Eyal, A.  
2016; 9 (9): 924-933
- **A Route to Laser Angioplasty in the Presence of Fluoroscopy Contrast Media, Using a Nanosecond-Pulsed 355-nm Laser** *IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS*  
Herzog, A., Steinberg, I., Gaisenberg, E., Nomberg, R., Ishaaya, A. A.  
2016; 22 (3)
- **All fiber sensor array for ultrasound sensing** *PHOTONS PLUS ULTRASOUND: IMAGING AND SENSING 2016*  
Gabai, H., Steinberg, I., Eyal, A.  
2016; 9708
- **Shaping photomechanical effects in tissue ablation using 355 nm laser pulses** *Journal of Biophotonics*  
Herzog, A., Steinberg, I., Ishaaya, A. A.  
2016
- **Multiplexing of fiber-optic ultrasound sensors via swept frequency interferometry** *OPTICS EXPRESS*  
Gabai, H., Steinberg, I., Eyal, A.  
2015; 23 (15): 18915-18924
- **Over 100km long ultra-sensitive dynamic sensing via Gated-OFDR** *24TH INTERNATIONAL CONFERENCE ON OPTICAL FIBRE SENSORS*  
Steinberg, I., Shiloh, L., Gabai, H., Eyal, A.  
2015; 9634
- **All-fiber ultrasound sensor array implemented by swept frequency interferometry** *24TH INTERNATIONAL CONFERENCE ON OPTICAL FIBRE SENSORS*  
Gabai, H., Steinberg, I., Shiloh, L., Eyal, A.  
2015; 9634
- **Investigation of a Dual modal method for bone pathologies using quantitative ultrasound and Photoacoustics** *PHOTONS PLUS ULTRASOUND: IMAGING AND SENSING 2015*  
Steinberg, I., Gannot, I., Eyal, A.

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2015; 9323

- **Broadband ultrasonic sensor array via optical frequency domain reflectometry** *PHOTONS PLUS ULTRASOUND: IMAGING AND SENSING 2015*  
Gabai, H., Steinberg, I., Eyal, A.  
2015; 9323
- **Tumor Localization Using Magnetic Nanoparticle-Induced Acoustic Signals** *IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING*  
Tsalach, A., Steinberg, I., Gannot, I.  
2014; 61 (8): 2313-2323
- **Robust estimation of cerebral hemodynamics in neonates using multilayered diffusion model for normal and oblique incidences** *JOURNAL OF BIOMEDICAL OPTICS*  
Steinberg, I., Harbater, O., Gannot, I.  
2014; 19 (7)
- **Monitoring LITT thermal penetration depth using real-time analysis of backscattered light** *JOURNAL OF BIOPHOTONICS*  
Shacham, R., Steinberg, I., Gandjbakhche, A. H., Gannot, I.  
2014; 7 (6): 381-391
- **Theoretical and experimental investigation of multispectral photoacoustic Osteoporosis detection method** *PHOTONS PLUS ULTRASOUND: IMAGING AND SENSING 2014*  
Steinberg, I., Hershkovich, H. S., Gannot, I., Eyal, A.  
2014; 8943
- **Multispectral photoacoustic method for the early detection and diagnosis of osteoporosis** *PHOTONIC THERAPEUTICS AND DIAGNOSTICS IX*  
Steinberg, I., Eyal, A., Gannot, I.  
2013; 8565
- **A new method for tumor detection using induced acoustic waves from tagged magnetic nanoparticles** *NANOMEDICINE-NANOTECHNOLOGY BIOLOGY AND MEDICINE*  
Steinberg, I., Ben-David, M., Gannot, I.  
2012; 8 (5): 569-579
- **Multilayer Mie scattering model for investigation of intracellular structural changes in the nucleolus and cytoplasm** *International Journal of Optics*  
Saltsberger, S., Steinberg, I., Gannot, I.  
2012
- **Time difference of arrival based cancer tumor localization using magnetic nanoparticles induced acoustic signals**  
Adi, T., Steinberg, I., Gannot, I.  
2012
- **The Role of Skew Rays in Biomedical Sensing** *IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS*  
Steinberg, I., Kaplan, E., Ben-David, M., Gannot, I.  
2010; 16 (4): 961-966
- **Ultrashort Laser-Pulse Medical Imaging** *Encyclopedia of Analytical Chemistry*,  
Ben-David, M., Cohen, R., Harbater, O., Steinberg, I., Tepper, M., Gannot, I.  
Wiley Online Library.2010
- **HOLLOW CORE WAVEGUIDES FOR RADIATION DELIVERY AND SENSING: MONTE CARLO, RAY TRACING COMPUTER SIMULATION** *OPTICAL FIBERS AND SENSORS FOR MEDICAL DIAGNOSTICS AND TREATMENT APPLICATIONS IX*  
Steinberg, I., Kaplan, E., Ben David, M., Gannot, I.  
2009; 7173