

# Metastructures for Photonics Applications

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A new class of planar optics has emerged using near-wavelength dielectric structures, known as high contrast metastructures (HCM). Many extraordinary properties can be designed top-down based for integrated optics on a silicon or GaAs substrate. Using a 1D HCM as a high reflectivity mirror, we demonstrated wavelength-swept vertical cavity surface emitting lasers (VCSELs) with 1 MHz swept rate and the largest, continuous swept range. Such devices have applications for data communications, LIDAR and optical coherent tomography applications. A single layer HCM can also be designed as high quality-factor surface-normal resonators. I will review recent results using and its applications as biosensor, 4-wave generation, and spatial light modulator. Finally, we also demonstrated a novel design that mimics the color tuning effect of chameleon skin with color change achieved simultaneously in a multiple-color pattern flat structure.

## Biography



Connie Chang-Hasnain is Associate Dean for Strategic Alliances of College of Engineering and Whinnery Distinguished Chair Professor in Electrical Engineering and Computer Sciences, at the University of California, Berkeley. She has been the Founding Co-Director of Tsinghua-Berkeley Shenzhen Institute since 2015. She is also the Chief Academic Officer of Berkeley Education Alliance for Research in Singapore (BEARS) and Proram Leader of BEARS' SinBeRISE (Singapore Berkeley Research Initiative on Sustainable Energy) program since April 2015. Prof. Chang-Hasnain received her Ph.D. from the same university in 1987. Prior to joining the Berkeley faculty, Dr. Chang-Hasnain was a member of the technical staff at Bellcore (1987–1992) and Assistant Professor of Electrical Engineering at Stanford University (1992–1995).

Professor Chang-Hasnain has been honored with many awards including the UNESCO Medal For the Development of Nanoscience and Nanotechnologies (2015), IEEE *David Sarnoff Award* (2011), the OSA *Nick Holonyak Jr. Award* (2007), etc. Additionally, she has been awarded with a *National Security Science and Engineering Faculty Fellowship* by the US Department of Defense (2008), a *Humboldt Research Award* (2009), and a *Guggenheim Fellowship* (2009). She was a member of the USAF Scientific Advisory Board, the IEEE LEOS Board of Governors, OSA Board of Directors, and the Board on Assessment of NIST Programs, National Research Council. She was the Editor-in-Chief of *Journal of Lightwave Technology* 2007-2012.