Large-scale integration of photonic systems on a single chip has so far been limited by the micron length scale of the telecommunication wavelengths. I will discuss a novel approach to resolve this issue using sub-THz acoustic waves, which possess an extraordinary combination of millimeter attenuation length and a wavelength of tens of nanometers. Tailored nanostructures play the pivotal role of unlocking such great potential, through enhancing the conversion between light and sound by orders of magnitude. Specifically, with nanostructures serving as both optical and acoustic waveguides, the radiation pressure and electrostriction from light function as sources of ultrahigh frequency acoustic waves. These acoustic waves can be used directly for signal processing or indirectly as a strong nonlinear optical modulation. A related approach using multi-material fibers further allows this concept to be applied to sensing and actuation over extended areas.

Speaker Bio:
Zheng Wang is an Assistant Professor in the Department of Electrical & Computer Engineering of the University of Texas at Austin. He received his B.S. degree in Physics in 2000 from University of Science and Technology of China (USTC), and his Ph.D. degree in Applied Physics from Stanford University in 2006. During his PhD, he focused on developing integrated photonic crystal devices for optical information processing. From 2006 to 2012, he worked as a postdoc associate and subsequently a research scientist at MIT. He pioneered topological photonic devices at microwave frequencies, and builds subwavelength optical and acoustic devices using periodic media and multimaterial fibers for signal processing, sensing and transduction applications. He has co-authored over 30 peer-reviewed journal articles and holds 2 US patents. Professor Wang joined UT Austin in January 2012, and he is a senior member of SPIE, and a member of IEEE, OSA, APS, and MRS. Professor Wang has been the recipient of the 2013 Packard Fellowship in Science and Engineering, the 2013 Alfred P. Sloan Research Fellowship, and 2014 3M Non-Tenured Faculty Award. He was named as a winner of TR35, the world's top 35 innovators under the age of 35, by MIT Technology Review in 2012.