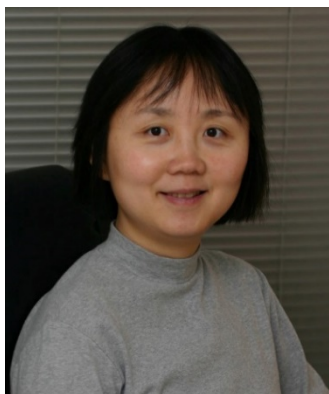




## BIRCK NANOTECHNOLOGY CENTER



**Hui Cao** received her Ph.D. degree in Applied Physics from Stanford University in 1997. Her doctoral research was in the area of semiconductor microcavity quantum electrodynamics. Prior to joining the Yale faculty in 2008, Professor Cao was on the faculty of the Department of Physics and Astronomy at Northwestern University from 1997 to 2007. Her technical interests and activities are in the areas of complex photonic materials and devices, nanophotonics, and biophotonics. She has co-authored one book and ten book-chapters, and has published more than 230 research papers in the areas of mesoscopic optics, random lasers, optical microcavities, photonic crystals, and structural coloration.

### Mesoscopic Optics

**Prof. Hui Cao**

**Dept. of Applied Physics, Yale University**

**Monday, January 22, 2018**

**11:30 am**

**Burton Morgan Room 129**

Random scattering of light, e.g., in paint, cloud and biological tissue, is a common process of both fundamental interest and practical relevance. The interference of multiply scattered waves leads to remarkable phenomena in mesoscopic physics such as the formation of open and closed transmission channels. In applications, optical scattering is the main obstacle to imaging or sending information through turbid media. Recent developments of adaptive wavefront shaping in optics enabled imaging and focusing of light through opaque samples. By selective coupling to open or closed channels, we varied the transmission of a laser beam through a highly scattering system by two orders of magnitude, and drastically changed the energy density distribution inside the system. Furthermore, by adding optical gain to a disordered medium, we realized random lasing and demonstrated its application to speckle-free full-field imaging. Finally, we developed a fast and efficient method of switching the spatial coherence of a laser, and applied it to multimodal microscopy.