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Lasers are the coherent sources of high frequency electromagnetic radiation with applications spanning all physical sciences and technology. In this talk I will introduce a new class of laser, named plasmon laser that surpassed the diffraction limit of light. By exciting surface plasmons, collective electronic oscillations at metal-dielectric interfaces, the close proximity of the semiconductor and metal interfaces concentrates light into a space well below the diffraction limit. I will present the results of first solid state plasmon laser operated at room temperature where the light-matter-interaction has been strongly enhanced. I will also discuss how to manipulate the radiation properties of a plasmon laser to overcome two fundamental constrains, the lacks of directionality and low radiation efficiency of plasmon laser. I will conclude by introducing some applications of plasmon laser.

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Dr. Ren-Min Ma received the Ph. D. degree in Physics from Peking University in 2009. His dissertation was focused on nanoscale optoelectronic devices and physics and received the National Top 100 Ph.D. dissertations of China Award. He is currently a leading postdoctoral scholar at UC Berkeley where he works on the development of plasmon laser, as well as nanophotonics and quantum optics.

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Photograph by Xiaodong Hu