DEPARTMENT OF MECHANICAL ENGINEERING COLLOQUIUM

UNIVERSITY OF CALIFORNIA
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The Department of Mechanical Engineering
PRESENTS

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WCH Room 205/206
11:10-12:00PM

Nonlinear optics and waveguiding devices based on metallic nanoparticles embedded in glass

Abstract:
Composites containing nanoparticles of different materials have attracted considerable attention for their nonlinear optical properties in the recent past. Metallic nanoparticles embedded in dielectric matrices such as silica are particularly interesting because of the surface plasmon resonance absorption features, and the enhancement of the third-order nonlinear optical response associated with it. Another important aspect is the possibility to tailor the nonlinear response of such effective media through manipulation of the composition, density, shape, and placement of the nanoparticles. Possible applications of these materials are in signal processing systems, and entangled photon pair generation, which require the implementation of switches and other photonic devices in waveguide form. Therefore, if the large nonlinearities of nanoparticle containing composites are to be exploited in all-optical switching devices, it is important to be able to produce efficient waveguiding devices based on them.
Dr. Rangel-Rojo will present the study of the nonlinear optical properties of different composites consisting of metallic nanoparticles embedded in silica produced by the ion implantation technique. He will also present efforts to produce waveguides based on these materials by direct patterning through femtosecond pulse irradiation, and its characterization by second harmonic generation microscopy. Finally, he will show the use of masked multi-energy ion-implantation to produce channel waveguides, and their characterization.

About the Speaker:
Raúl Rangel-Rojo received his Bachelor's degree in Physics from Universidad Autonoma Metropolitana Iztapalapa in Mexico City, from which he also received a MSc in Physics. He then went on to do an MSc in Optoelectronics and Laser Devices at Heriot-Watt University in Edinburgh Scotland, and he also did his PhD in Physics at Heriot Watt. After his PhD, Dr. Rangel-Rojo joined the Department of Optics at CICESE in Ensenada, Baja California, Mexico, where he has been working ever since. He did a postdoctoral stay at the National Institute of Materials and Chemical research in Tsukuba, Japan, and has done research stays at Heriot Watt University in Scotland, the Universidad de Santiago de Compostela in Spain, and UC Davis. His research interests include ultrafast laser sources, fiber lasers, nonlinear opticas, and more recently the optical properties of nanostructured materials and quantum optics.