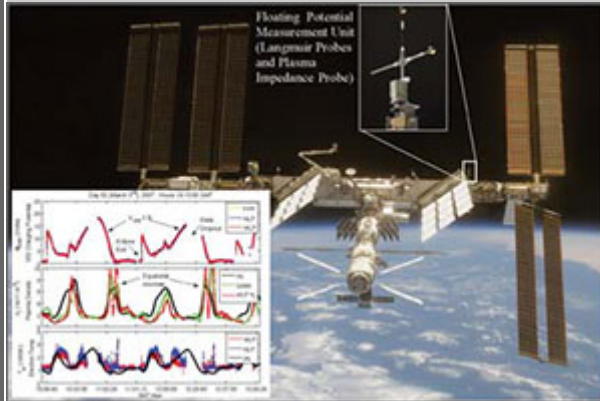
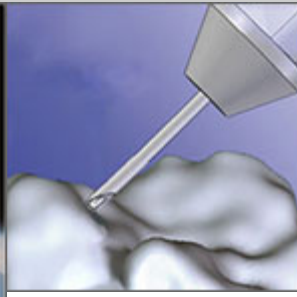


## Review of Scientific Instruments

A monthly journal devoted to scientific instruments, apparatus, and techniques.



Floating Potential Measurement Unit (Langmuir Probes and Plasma Impedance Probe)



## News & Announcements from RSI

RSI is #1 in Instruments & Instrumentation (Thomson

Reuters, 2008)

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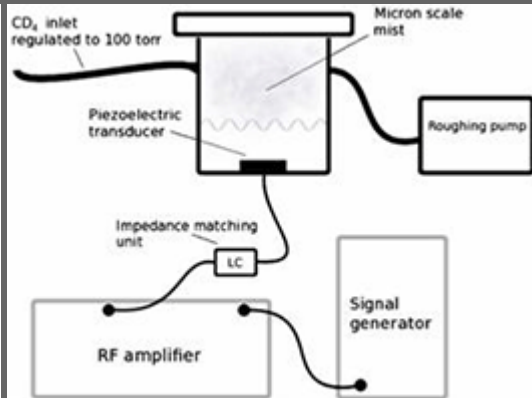
### Physics Update—Probing Elasticity in Diseased Tissue

Early detection of mechanical property changes in biological tissue could signal the onset of disease. To measure the elasticity of tissue in living patients, needle-based indentation methods are more direct and less expensive alternatives to MRI, ultrasound, and electrical impedance. Such a probe has recently been developed by University of California, Santa Barbara, physicist Paul Hansma, an atomic force microscopy expert, and his collaborators.

[Physics Update](#) | [Rev. Sci. Instrum. 80, 054303 \(2009\)](#)

### Invited Article

**Data analysis of the Floating Potential Measurement Unit aboard the International Space Station**



Aroh Barjatya, Charles M. Swenson, Donald C. Thompson, and Kenneth H. Wright, Jr.

The Floating Potential Measurement Unit (FPMU) that is deployed on the starboard truss of the International Space Station is a suite of instruments capable of redundant measurements of various plasma parameters. The instrument suite consists of a floating potential probe, a wide-sweeping spherical Langmuir probe, a narrow-sweeping cylindrical Langmuir probe, and a plasma impedance probe. This paper gives a brief overview of the instrumentation and the received data quality, and then presents the algorithm used to reduce I-V curves to plasma parameters. Several hours of data are presented from 5 August 2006 and 3 March 2007. The FPMU derived plasma density and temperatures are compared with the International Reference Ionosphere (IRI) and Utah State University-Global Assimilation of Ionospheric Measurement (USU-GAIM) models.

[Rev. Sci. Instrum. 80, 041301 \(2009\)](#)

## Research Highlights

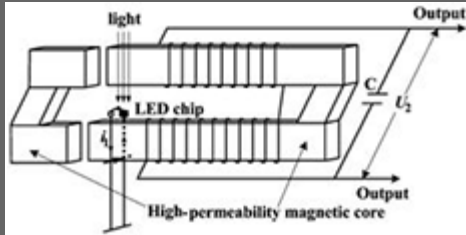
Visit the [RSI homepage](#) to view the newly created Research Highlights feature.

### Generation of Mie size microdroplet aerosols with applications in laser-driven fusion experiments

A. P. Higginbotham, O. Semonin, S. Bruce, C. Chan, M. Maindi, T. D. Donnelly, M. Maurer, W. Bang, I. Churina, J. Osterholz, I. Kim, A. C. Bernstein, and T. Ditmire

A terawatt Ti:Al<sub>2</sub>O<sub>3</sub> laser focused to  $2 \times 10^{19}$  W/cm<sup>2</sup> was used to irradiate heavy water (D<sub>2</sub>O) aerosols composed of micron-scale droplets. Energetic deuterium ions, which were generated in the laser-droplet interaction, produced deuterium-deuterium fusion with approximately  $2 \times 10^3$  fusion neutrons measured per joule of incident laser energy.

[Rev. Sci. Instrum. 80, 063503 \(2009\)](#)

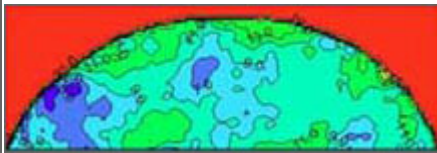


### Light emitting diode fault detection using $p-n$ junction photovoltaic effect

Ping Li, Yumei Wen, Youhai Cai, and Lian Li

An online noncontact fault detection method during light emitting diode (LED) chip packaging based on the photovoltaic effect in  $p-n$  junctions is proposed. Through characterization of the weak photovoltaic response in a lead frame with 20 LED chips, five LED faults, including chip defects (chip quality and chip contamination) and bonding deficiencies (disconnection, debonding, and rebonding), can be detected before packaging.

[Rev. Sci. Instrum. 80, 055108 \(2009\)](#)



### Quantification of unsteady heat transfer and phase changing process inside small icing water droplets

Zheyang Jin and Hui Hu

The transient behavior of the phase change process within small icing water droplets was revealed using molecular tagging thermometry. Such measurements improve our understanding of microphysical phenomena pertinent to ice formation and accretion processes as water droplets impinge onto wind turbine blades.

[Rev. Sci. Instrum. 80, 054902 \(2009\)](#)



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