

## Details of CARE Facility

**Name of CARE facility: 3-D Surface Profilometer to Characterize Material Surfaces**

**Location:** Laboratory of Advanced Ceramics (next to Physics Workshop or near to WL extension)

**Total cost of equipment/facility: 33.2 Lakhs**

**Year of CARE funding: 2002-03 and Operational since, March, 2003**

**Support provided by CARE: 18 Lakhs (matching grant of Rs. 15.2 lakhs form a BRNS Project)**

**Name of Principal Investigator: Dr. Bikramjit Basu ([bikram@iitk.ac.in](mailto:bikram@iitk.ac.in); Tel: 7771/7920)**

**Participating departments: MME, ME, ChE**

### Brief description and capability of CARE facility:

LSP works on the principle of Dynamic focusing of a laser beam and evaluation of the objective position. In particular, IR light (wavelength 780 nm) through guided objective is focused on the specimen surface. The reflected light is subsequently assessed by the objective and directed to a focus detector. The moving position of the objective is converted to an electrical signal via a position transducer. The profile spacing position of the specimen in the Y-axis is controlled by a timed motor and the acquired signal is processed by commercial software.



### Technical Specifications:

**Laser probe spot radius: 2 $\mu$ m**

**Reflectivity of sample: should be between 4 % and 95 %**

**Working distance: 10mm**

**Spatial resolution: 0.1  $\mu$ m (approx)**

**Vertical resolution: 5 nm (depending on measuring range, below 0.1  $\mu$ m depth not tested till now)**

**Vertical measuring range:  $\pm 250 \mu$ m or  $\pm 25 \mu$ m**

**Scanning speed: 0.1 to 0.5 mm/sec for different cut-off / traversing lengths**

**Maximum area to be scanned: 56 X 56 mm<sup>2</sup> or 120 X 56 mm<sup>2</sup>**

**Utilization of the facility: a) PI : Mostly for analysis of wear tracks/scars, area and depth of various 2-D profiles, surface roughness measurements**

**b) Others: Dr. Sumit Basu (ME): Surface roughness of eroded polymer nanocomposites**

**Dr. Animanshu Ghatak (ChE): Roughness of polymeric films**

**Dr. Deepak Gupta/M. Katiyar (MME): Thickness of as-deposited electronic films**

**Dr. N V Reddy (ME): Surface roughness of machined surfaces**

**Dr. S. Khandekar (ME): Groove roughness of flow channels**

**Dr. Ashutosh Sharma (ChE): Surface roughness after laser lithography experiments**

**Dr. Utpal Das (EE): Surface quality of electrode surface**

**Mechanism of time sharing: Monday and Fridays in every week and on other days, if required.**

**Charging mechanisms: Rs. 200 /- per scan**

**Any difficulties, which you faced in running CARE facility: No full time technical personnel to look after this CARE facility is available at present. PhD students help the users of this machine on every Friday and if required, on any other day during the week, depending on the urgency of the USER. Mostly, it has been noticed that this facility is accessed by many USERS on even Saturdays and Sundays.**

**Link to the website for the CARE facility, if any: <http://home.iitk.ac.in/~bikram>**