Fig. L.8.1 View of the deposition system.

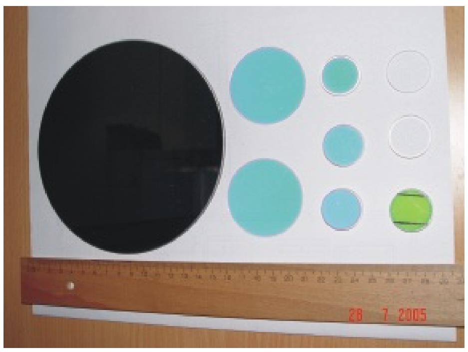

Fig. L.8.2 View of some of the coatings made.

Coatings were done are: (i) AR coatings on lenses used for coupling a Nd:YAG laser into optical fibre, (ii) Specialized AR coatings on the end faces of Nd:YAG laser rods. These coatings were found to be hard and withstood laser fluence of 1.2 GW/cm^2, (iii) Gold coating on Si wafer with rms roughness less than 1nm for Indus-1 beam line, (iv) Very thick gold coating on Al foils of different thickness to be used as targets for laser produced plasma experiments, (v) Aluminium coating on 100mm dia. glass samples for Spectroscopy Div., BARC, (vi) Thick Ti coating on 240 mm diameter copper disc is being developed for IGCAR. Fig. L.8.2 shows the view of a few coated elements.

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L.9 Advancement in sealed-off nitrogen laser system and uranium analyzer

A compact sealed-off nitrogen laser module with a life of more than a year has been developed, which is suitable for field applications. A setup for laser tube assembly and processing facility has been established for vacuum processing the metal-ceramic laser tube before filling and sealing. The laser tube is connected to the vacuum system via a glass-to-metal seal. A double stage liquid-nitrogen trap is incorporated between the vacuum system and the laser tube. This ensures that the volatile impurities such as water vapor and carbon dioxide can be trapped from the filling nitrogen gas, which is detrimental to the laser tube lifetime. The tubes are baked till all out-gassing ceases and then filled with Iolar (grade-I) nitrogen gas. They are run for a sufficient time till the output power stabilizes, then refilled with fresh gas and sealed. Such laser tubes are operated at an underrated voltage of 6 kV for reliability, and produce 30μJ pulses at 10 Hz repetition rate. The Nitrogen laser module has a size of 145 x 75 x 50 mm, works on 12V DC and is an important import substitute.

Fig. L.9.1 The compact version of the Laser Uranium Analyzer

An ultra compact version of laser uranium analyzer has also been developed using the above mentioned compact nitrogen laser tube (fig. L.9.1). Its detection sensitivity ranges from 0.01ppb to 20ppb and requires only 6 W power. It uses a miniature spark gap operating on 12V, SMD based electronics for data acquisition and processing, a compact detector module with a miniature PMT and power supply using SMD components. This is an important import substitute. Three such systems have been assembled and are undergoing test and calibration. Twenty systems are being engineered for various users in DAE, for use in uranium mining, radio chemistry, effluent monitoring & health physics applications.

(Contributed by: A.G. Bhujle; bhujle@cat.ernet.in, S. Raja, Shyamsundar, V. Bhange, V.P. Deshpande, C. Rajan)

L.10 Compact density measurement station

Compact density measurement station has been developed for the metrology of sintered uranium oxide fuel pellets for Nuclear Fuel Complex (NFC) (fig.L10.1). This is designed around a multiplexed optical system to reduce the electronic complexity. A single scanner is used to generate the scans using a multiplexing prism as well as electronics implemented in CPLD to make the instrument compact and reliable.