INTERNATIONAL NUCLEAR TARGET DEVELOPMENT SOCIETY

NEWSLETTER

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International Nuclear Target Development Society

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Editors Note

Dear Colleagues,

The 17th World Conference of the INTDS takes place in October. Please do not forget that some financial support from INTDS is available for speakers at the conference. Any INTDS member may propose himself/herself or a junior colleague, for example, who may otherwise not be able to attend. The President, Hans Maier, wishes to encourage new participants and those from developing countries and hopes that members will take advantage of the funds available.

Proposals, including an abstract of the suggested contribution should be submitted to the President.

Chris Ingelbrecht
Editor

FINAL CALL FOR PAPERS FOR THE

17th World Conference of the INTDS

"Targets, Research Materials, and Related Topics of Hadron Physics"

Bloomington, Indiana 47408, USA, Oct. 17-21, 1994

The 17th World Conference of the International Nuclear Target Development Society will be held in Bloomington, Indiana, USA, on October 17-21, 1994. Conference contributions will describe methods used in the preparation, characterization, and application of targets for low, medium, and high energy accelerator experiments. Reports on preparation procedures for precious research materials used in various other scientific investigations will be included as well as presentations on techniques for particle detection devices. Thus, contributions are encouraged in the following areas:

1. Preparation and sampling of high purity and special materials;
2. preparation and characterization of internal and external targets of light and heavy ions;
3. stripper, neutralizer, and window foils;
4. oxide reductions and electrolytic target processes;
5. impact of target parameters on experimental results;
6. separation and chemical processing of stable and radioactive isotopes; and
7. thin film, surface, and solid state properties of targets.

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Deadlines Submission of Abstracts: July 31, 1994, Hotel Reservation: September 15, 1994
Registration Fee: $250.00 INTDS member, $300.00 non-member
Registration Fee *after Sept. 15 is $25.00 more*
Submission of Papers: October 15, 1994

Sponsors The National Science Foundation via IUCF
The Office of Research and the University Graduate School, Indiana University
The Office of the Vice-President and University Chancellor, Indiana University
The Office of International Programs, Indiana University

Publication of Proceedings Nuclear Instruments & Methods in Physics Research

TARGET LAB TECHNICAL STATUS

(Prepared for the IUCF Scientific and Technical Report, May 1993 - April 1994)

William Lozowski

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Production of various targets and diagnostic foils for the accelerators required 29 man-weeks. The balance of the lab effort was applied to the target development projects summarized below.

○ Carbon micro-ribbons and stripper foils: A technique was developed to texture glass substrates lacking surface scratches characteristic of our earlier (hand-grinding) methods. In large part, the scratches are thought to have determined the minimum thicknesses achievable for open-edged stripper foils and micro-ribbons. The new method used a homemade slurry gun[1], powered with compressed air, to erode glass surfaces at a distance of 5-10 mm from the end of the gun. Significantly thinner ribbons and foils are likely to be produced with use of these more uniform substrate surfaces.

○ Thin Teflon FEP gas-cell windows for CE-35: Using a new pulse-width-modulating speed reducer purchased for the 2-high rolling mill, a method was developed to hot-roll large pieces of ~ 1 mg/cm^2 thick commercially available Teflon film to thicknesses of ~ 350 μg/cm^2. The technical details to produce cell windows having the required area of 8 × 30 cm^2 will be described in a contribution to the 17th World Conference of the INTDS, October 17 - 21, 1994.

○ Slow-speed hot rolling of CD_2 and CH_2 enabled uniform 3 - 10 mg/cm^2 targets to be made from starting material of ~ 50 mg/cm^2. As expected, slow-speed rolling was found also to have great value for producing thin films of soft elements such as indium, lithium, and lead.

○ Melamine targets of 100, 200, 500, and 2500 μg/cm^2 were vacuum evaporated (contract with NIST) onto 100 μg/cm^2 films of stretched polypropylene. A baffled large evaporation source was developed to provide the required uniformity (≤10% thickness variation for 10-cm diameter melamine films). There were no telltale signs of decrepitation (from the source) on the melamine targets.

○ As part of a task to produce ^{6}Li targets of 2 - 3.0 mg/cm^2 having extremely low levels of oxygen and hydrogen, trials were conducted to explore how lithium and other extremely reactive elements might best be protected during handling, rolling, and long-term storage. M. Fugiwara of the Research Center for Nuclear Physics (RCNP, Osaka University) provided tips concerning the protective attributes of high-grade mineral oil and P_2O_5. Films of 1.8 mg/cm^2 lithium that remain shiny after five months were obtained by: i) heating then degassing high-grade oil by pumping on it; ii) covering the lithium with oil during rolling and providing an argon-filled glove box near the rolling mill; iii) storing the finished targets under degassed oil in a jar which also contained dry P_2O_5 powder.

Perhaps predictably, petroleum jelly (petrolatum or paraffin jelly) was found to have an excellent ability to protect thin films of lithium during long-term storage, even without the aid of P_2O_5. The jelly was heated to 383 K (at which it is liquid) and allowed time to degas (~ 1 hr) before 2 - 10 mg/cm^2 rolled lithium films were submerged in it. Layers of the solidified jelly about 1 mm thick have been adequate to keep lithium films bright for five months (an ongoing test).

○ Poco Graphite of about 10 mg/cm^2 was thinned to 3 mg/cm^2 by a hand-grinding and scraping technique. The foils are robust in comparison to comparably thin carbon foils made by our pressed-powder techniques. They are finding use as calibration standards and Cooler skimmer targets.

○ Modification and construction of the saddle-field sputter gun continued. The gun became nearly ready for testing, but this persuit was delayed to enable completion of others.

1 A Spray Gun to Texture Glass Substrates for Carbon Micro-ribbons, W. Lozowski, INTDS Newsletter, June 1993, vol 21, no.1.

Activity Report 1993

Xu Guoji

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Targets Produced

Some 300 requests for different types of targets were satisfied in 1993. The majority of these targets were made by evaporation and rolling.

^{156}Gd has been rolled down to 0. 34 mg/cm^2. W(nat) targets of 3. 6mg/cm^2 have been rolled with intermediate annealing.

Selfsupproted ^{122}Sn targets of 0. 6mg/cm^2 have been obtained by rotating substrate at a source to substrate distance of 1. 5cm with collection efficiency of 0. 04mg/cm^2 • mg and homogeneity of 95%.

Carbon Foils

Approximately 600 carbon stripper foils were produced as well as carbon foils for backings by carbon arc method.

Focused Heavy-ion Sputter

Our focused heavy-ion sputtering system built in 1983 was equipped with duoplasmatron ion source. The lifetime of the filamant was sourt that targets with a thickness greater 0. 2mg/cm^2 from materials with low sputtering yield were difficult to be produced in one step. Therefore we have changed the duoplasmatron ion source for a penning ion source.

Recent and former data show that the sputtering yield has no dependence with target mass number. The sputtered targets were in 1993: ^{42}Cao/c ^{185}Re/Al ^{182}W/Al ^{113}Cd/c ^{116}Cd/c ^{155}Gd/Au ^{100}Ru/Pb ^{10}B/c ^{185}Re/Pb ^{187}Re/Pb.