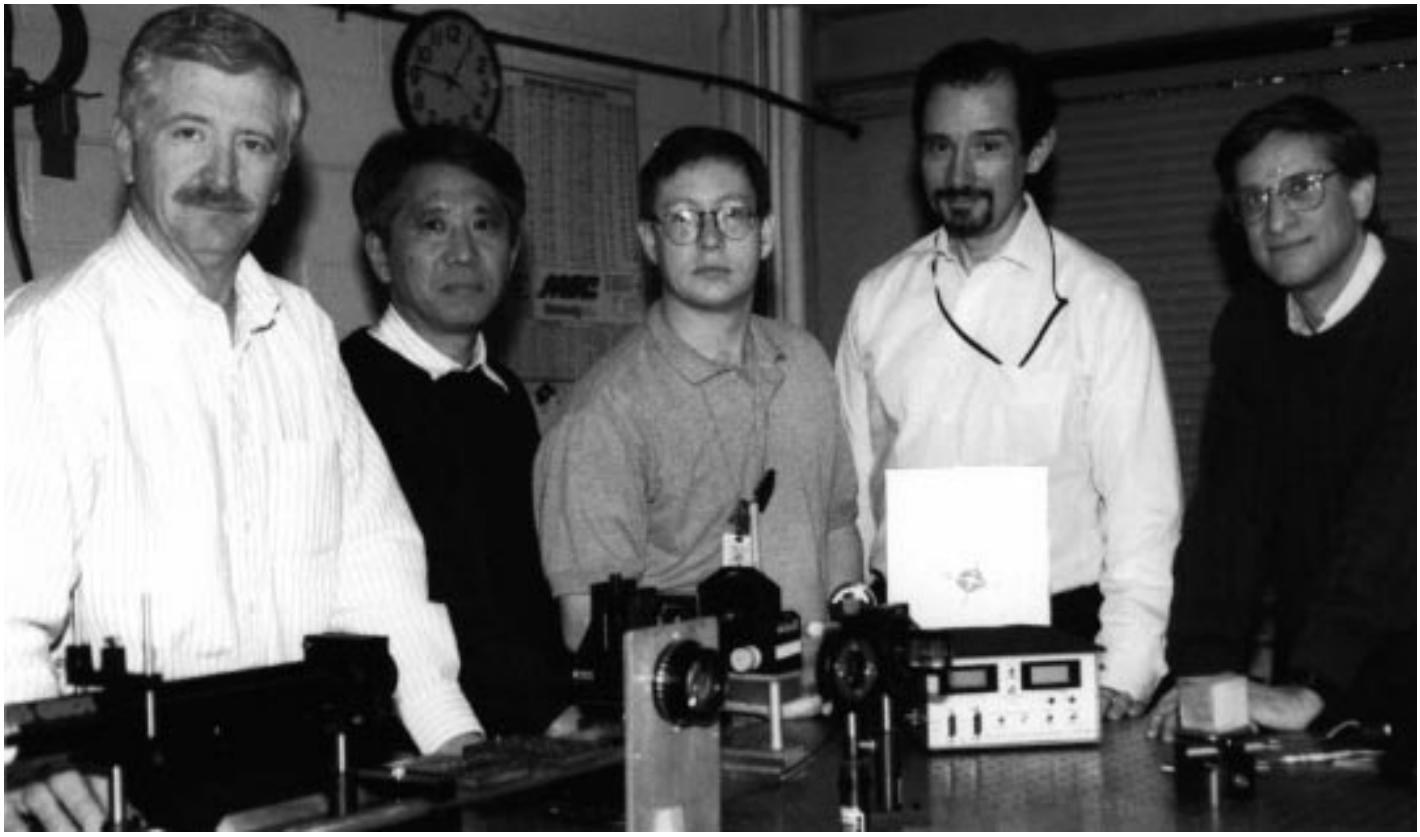
PPPL Funded for Textile Research Collaboration



PPPL staff involved in the AMTEX project are (from left) Dennis Mansfield, Hideo Okuda, Mark Cropper, Phil Efthimion, and Stewart Zweben. The laser device is on the table in front of Efthimion. Not pictured is Lewis Meixler.

By Anthony De Meo

PPPL will receive $700,000 in fiscal year 1998 under a recently established Cooperative Research and Development Agreement (CRADA) between the Laboratory and the Princeton Textile Research Institute. The agreement is part of the American Textile Partnership (AMTEX) — a government-industry consortium which includes many of the nation's leading textile and apparel manufacturers. Under the terms of the CRADA, Laboratory staff will develop state-of-the-art optical techniques for the on-line characterization of synthetic fibers during production.

"The AMTEX Partnership provides PPPL scientists with the opportunity to apply technology developed in

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AMTEX

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magnetic fusion research to help solve a significant industrial problem in the near-term. We are pleased to join our colleagues from other DOE-supported laboratories participating in AMTEX," noted PPPL Director Rob Goldston.

PPPL's Dennis Mansfield is the Principal Investigator on the CRADA. He will be joined by Phil Efthimion and Stewart Zweben, who will act in administrative capacities, and Hideo Okuda, who will be involved in theoretical and numerical work on the project.

Said Mansfield, "There will be an enormous economic benefit, if we can monitor and control the characteristics of synthetic fibers such as nylon and dacron on-line during the manufacturing process. Substantial time and money will be saved by eliminating the need to stop production to remove samples for off-line laboratory analysis." PPPL scientists also expect to expand greatly the number of fiber properties that can be measured.

On-line measurement of the physical and chemical properties of textile fibers will allow process adjustments to be made immediately — a substantial advantage. It is anticipated that vastly improved process reproducibility, efficiency, and quality control will result, eliminating the over-production presently needed to insure an adequate supply of fiber with consistent characteristics.

For years, PPPL scientists have used sophisticated lasers operating in the infrared, visible, and ultraviolet wavelength ranges to study the properties of hot ionized gases — high-temperature plasmas in which fusion reactions occur. The PPPL staff will now apply these well-developed research tools to help textile manufacturers.

Light Scattered from Textiles

Specifically, laser light will be scattered from textiles during and immediately following solidification of the extruded fibers, as well as during the drawing process. During these processes, the fibers are moving at speeds up to 30 miles per hour. The light scattered from fibers under these conditions contains important information about the physical and chemical make-up of the polymer under investigation.

Mansfield noted, "Whatever instrument comes out of this work will have to function in the difficult environment of a factory floor; it will, therefore, have to be robust. In this regard, making delicate measurements on a factory floor presents many of the same challenges that arise in the environment of a fusion device. We hope to be able to exploit the revolutions which are currently taking place in the fields of laser physics, modern optics, and computer science to meet these challenges." ●