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FINAL REPORT

RESEARCH EQUIPMENT: DoD URI P

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KATHE A J. KEMPER
Chief, Technical Information Division

AFOSR
Grant AFOSR 84-0307

15 September 1984 - 14 September 1985

Frank E. Karasz
Polymer Science and Engineering
University of Massachusetts
Amherst, MA 01003
Research Equipment: DoD URIP

The grant provided substantial funding for a state-of-the-art transmission-electron microscope and for a variety of spectrometric equipment and ancillary facilities. Both areas of instrumentation are heavily utilized by DoD-related and other polymer science researchers and both provide the most versatile and sophisticated instrumentation available.
ACKNOWLEDGEMENT

The Principal Investigator would like to express his sincere thanks to Dr. Donald L. Ball, Director of Chemical Sciences, Air Force Office of Scientific Research, to Dr. Donald R. Ulrich, Program Manager, Directorate of Chemical Sciences, and to other members of the Directorate for their unfailing cooperation, help and courtesy extended to him during the period of this contract.
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I. TITLE: Research Equipment: DoD URIP

II. PRINCIPAL INVESTIGATOR: Dr. Frank E. Karasz
Polymer Science and Engineering
University of Massachusetts
Amherst, MA 01003

III. CONTRACT NUMBER: AFOSR 84-0307

IV. DATES: 15 September 1984 - 14 September 1985

V. SENIOR RESEARCH PERSONNEL: None

VI. JUNIOR RESEARCH PERSONNEL: None
VII. ABSTRACT OF ACCOMPLISHMENTS

The grant provided funds for a transmission electron microscope, a FTIR spectrometer, a UV-VIS spectrometer and ancillary equipment. All this apparatus is used extensively by DoD supported P.I.'s in the Polymer Science community. In the case of the electron microscope and the UV-VIS spectrometer the equipment is state-of-the-art, and provides the most modern instrumentation available. The URIP goals have thereby been completely fulfilled.
VIII. DESCRIPTION OF ACCOMPLISHMENTS

The instrumentation provided by the URIP grant falls into three areas.

a) Transmission electron microscope
   This is a state-of-the-art JEOL 35CF Transmission Electron Microscope which is heavily used by the E.L. Thomas research group and others. It has been used for morphological studies of block copolymers, of blends, of composites, etc. and provides the most modern capabilities in this area.

b) FTIR Spectrometer
   This is an IBM FTIR IR/38 instrument which is used by the blend research group (Karasz/MacKnight) for studying inter-macromolecular interactions in high temperature advanced structural blends.

   Figure 1 and 2, attached, provide examples of the resolution achievable with this instrument.

c) UV-VIS Spectrometer
   This instrument (Perkin Elmer Lambda 9) and associated electrochemical equipment is being used to study conducting polymers (Figure 3). The resolution and wave-length range have provided unique quantum chemical information concerning electronic transitions in poly (phenylene vinylene). The electrochemical apparatus has permitted quantitative studies of oxidation-reduction (doping) processes in PPV. Together, this instrumentation provides a timely and unique facility.
Interactions, as depicted in 2-shifts, in \(-\text{NH}\) group (A) and carbonyl group (B) in PBI/PI blends.
FIGURE 3

UV-Vis Spectra of Poly(para phenylenevinylene)
1,2,3-partially eliminated polymer film
4-Poly(para phenylenevinylene) thin film
IX. PUBLICATIONS

None

The URIP equipment has been operational for 6-9 months. A very large number of publications in morphology, blends, conducting polymers, and new syntheses coming from this department will to some extent be made possible by this apparatus.
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