Introduction to Ethical Aspects of Scientific Work

PSCI 4442
February 6th, 2009
What is ethics?

- Dictionary definition: (1) the study of standards of conduct and moral judgement 2. the system of morals of a particular person, religion, group, etc.

A Look at Some Case Studies

- Groups of two-three
- You will be given a sample case study of a scientific ethical dilemma
- Visit in your group for about 10 minutes to attempt to answer the questions posed in your case study
- Add questions if you feel moved to do so
- Have a spokesperson summarize the case study for the class and give the group’s answers to the questions posed
In looking at all of the case studies, can you identify general categories of ethics concerns to be considered in science?

Can you think of other categories not represented by these case studies?
Some categories to consider

- Experimental Techniques and the Treatment of Data
- Values in Science
- Conflict of Interest
- Publications and Openness
- The Allocation of Credit
- Authorship Practices
- Error and Negligence in Science
- Misconduct in Science
  (See reference at end of presentation)
Examples of Citing Authors and Roles

Rodgers – Graduate Advisor
Ford – Acquired data/already graduated. Asterisk indicates Ford at Halliburton at the time of publication
Buckley – Worked data/wrote article
Roland – NRL Scientist – brains behind operation – wrote article

Buckley – 10-week ASEE summer faculty fellow – acquired and analyzed data

THERMAL CRYSTALLIZATION OF POLYTETRAHYDROFURAN NETWORKS

C. MICHAEL ROLAND
CHEMISTRY DIVISION, CODE 6120, NAVAL RESEARCH LABORATORY, WASHINGTON, D.C. 20375-5000

AND

GARY S. BUCKLEY
CAMBRIDGE UNIVERSITY, LANTANO, OKLAHOMA 73060-6277

INTRODUCTION

Poly(oxytetramethylene) (or polytetrahydrofuran, PTHF) is often employed as the soft segment in polyurethane and polyester block copolymers, although the homopolymer itself has negligible commercial utility. PTHF rubbers can serve as useful model systems for the study of mechanical and crystallization behavior. The thermodynamic stability of the crystalline state is reflected in the equilibrium melting temperature, T_m. Equilibrium melting refers to the melting of crystals lacking significant interfacial energy or internal defects. Approaches for determining T_m include the use of low-molecular-weight analogues or infinitely slow heating rates, as well as the extrapolation of melting temperatures obtained at increasing annealing times, or increasingly high crystallization temperatures. In a crosslinked material, the network junctions are inherent defects, expected to inhibit both the extent and the stability of the crystalline phase. The present work was undertaken to characterize the influence of network structure on the thermal crystallization of PTHF. The influence of the length of network chains and dispersity of this length on the crystallization behavior was examined.

EXPERIMENTAL

The PTHF rubbers were prepared and characterized by Prof. R. S. Stein and Dr. L. Jong of the University of Massachusetts. Various unimodal and bimodal networks formed from
Roland – NRL Scientist – brains behind operation – wrote article

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Reversible Optical Data Storage on Poly(Ethylene Terephthalate)

G. S. BUCKLEY* and C. M. ROLAND

Chemistry Division, Code 6120
Naval Research Laboratory
Washington D.C. 20375-5042

A desirable feature of optical data storage processes is that they provide high contrast between the image and background. Thermal marking techniques are inherently advantageous in this regard, because of the nonlinearity of the response. A thermal method for lithography on polymer films has been developed based on selective exposure of the films to infrared laser radiation passing through a mask. Radiation induced crystallization, melting and ablation have been demonstrated with the processes prevailing at different levels of radiation intensity. These methods are capable of producing high resolution images with excellent edge accuracy and minimal interference from diffusion. The absence of interference effects is due to the nonlinear response of the polymer film to the radiation. The best resolution obtained to date (submicron) is limited by the size of the smallest features present on the masks used to create the pattern. The ultimate resolution achievable by these methods is presently unknown.

INTRODUCTION

There is considerable interest in the use of polymers as media for optical data storage, with a variety of techniques employed, such as chemical deposition, doping, ablation, etc. (1-5). Commercial feasibility of the holographic method requires that critical process because a single infrared photon provides sufficient energy to effect the marking event. Thermal processes are inherently nonlinear, since the extent of the medium’s response (i.e., the development of an ablated pit) is not simply proportional to the input intensity. Such nonlinearity provides for the inherent...
Reference


- Third edition is coming out about April 1, 2009