

## **Australian Institute of Physics – NSW Branch**

### **PHYSICAL PROPERTIES OF PLASTICS**

**Dr Kenneth Doolan**  
**School of Engineering & Industrial Design,**  
**University of Western Sydney**

**Tuesday 14th June @ 5.00PM**

Australian Institute of Nuclear Science and Engineering Lecture  
Theatre, Lucas Heights, Sydney.

*Summary of talk:* Plastics have revolutionised product design and fabrication by enabling products previously assembled from component parts made from metals, wood and ceramics to now be moulded in one single process that requires much lower energy and can therefore be carried out at much lower cost.

This talk will provide an overview of physical properties of plastics and will discuss research carried out on a variety of plastic resins during the past five years. Nuclear Magnetic Resonance techniques have been used to study molecular structure and motion within various samples of polyethylene and polypropylene resins, including some that were subjected to gamma irradiation to initiate cross-linking. Aluminium, silicon, nitrogen and hydrogen ions have been implanted into samples of polyethylene terephthalate (PET) and polycarbonate (PC) plastics. Diffusion rates of helium through the ion implanted PET samples have been determined. Wear testing and nanoindentation measurements have been carried out on the implanted PC samples. Various results will be presented and commercial applications will be discussed.

*Details:* For more information please contact Dr Fred Osman (phone (02) 4736-0750, email: f.osman@uws.edu.au)

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#### ***Brief Biography of the Speakers:***

Ken Doolan has been Industry Liaison member of the Committee of the NSW Branch of the AIP for the past 6 years and has been responsible for organising the last three Physics Industry Days. Ken conceived the idea of having a Winter School for Nuclear Science at ANSTO organised by AINSE and was initial chairman of and is currently a member of the Winter School's organising committee. After completing a PhD degree in 1975 at the University of Sydney

on "Pulse studies in Nuclear Quadrupole Resonance Spectroscopy" Ken held a tutorship in the School of Physics UNSW for five years and carried out research on properties of magnetic materials and metal hydrides using NMR spectroscopy. From 1980-81 Ken held a postdoctoral fellowship with CSIRO Division of Energy Technology and from 1982-87 he was a Research Associate within the Department of Physical Chemistry at the University of Sydney where he undertook research into rapid heating & decomposition of fine coal particles using a shock tube. From 1988 to the present Ken has been a lecturer in Physics at the University of Western Sydney where he has been developing undergraduate subjects in physics, presenting undergraduate lectures on condensed matter physics & materials science and conducting research on physical properties of materials.

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***Detailed Schedule for Tuesday, 14 June 2005:***

- **4:30-5.00 pm** **Drinks and nibbles, AINSE Lecture Theatre.**
  - **5.05-6.00 pm** **Talk by Dr Ken Doolan.**
  - **6.15 pm** **Dinner with the Speaker.**
- E-mail Dr Fred Osman if you will be able to join us for dinner.*

***Travel Directions:***

**AINSE** is located 40km southwest of Sydney CBD and can be referenced in Sydney street directories. A typical car journey from the CBD will take about 45 minutes. See map below.

**From Sydney**

Take the M5 East (Toll Required) to Fairford Road. Turn left into Fairford Road and follow to Alfords Point Road. Continue straight until arrival at AINSE (on left).

Alternatively follow the Princes Highway through Newtown to Engadine. Turn right into Heathcote Road and then turn right into New Illawarra Road.

**By Train**

To Sutherland or Engadine Stations on the Illawarra Line. Taxis connect at Flora Street, Sutherland and at Station Street, Engadine.

*Map:*

