

# Strathclyde Chemistry I

Alexander J.C. Kuehne, Allan R. Mackintosh, Richard A. Pethrick  
 Pure and Applied Chemistry  
 E. Gu, M. Wu, B. Guilhaburt M.D. Dawson<sup>1</sup>  
 IOP  
 C. Belton and D.D.C. Bradley  
 Imperial Physics



## Highly UV transparent materials

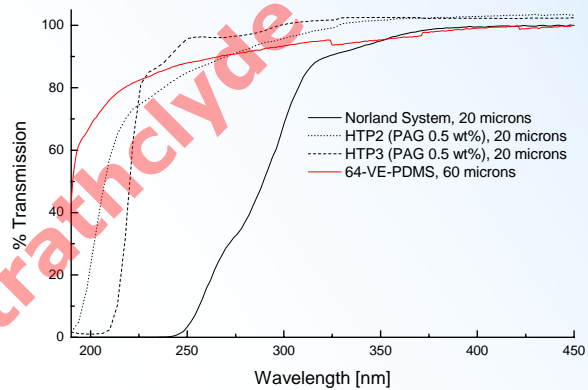
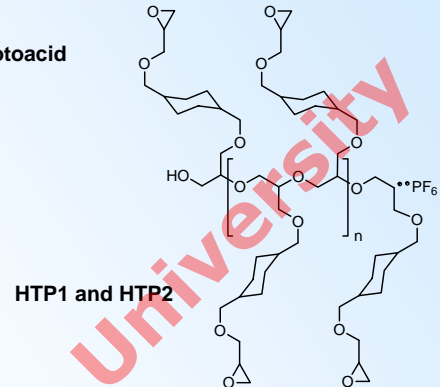
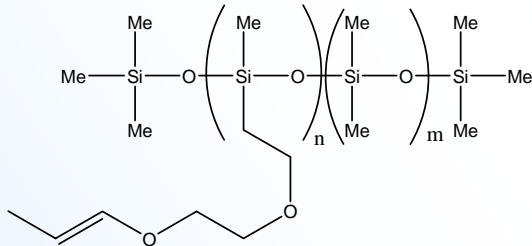
HTP1 and HTP2 are epoxy functionalised carbon based materials. Depending on the photoacid nature these can be crosslinked in the near (HTP1) or deep UV (HTP2).

HTP3 is a vinyl ether functionalised carbon based material.



Novel Polydimethylsiloxane materials allow high transparency into the deep UV spectrum:

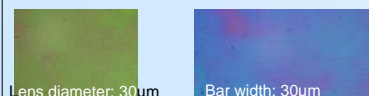
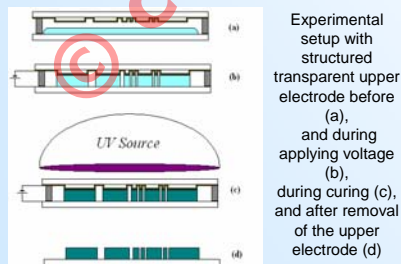
- Siloxane backbone is less absorbing than carbon based materials
- Vinyl ether and propenyl ether groups allow fast crosslinking



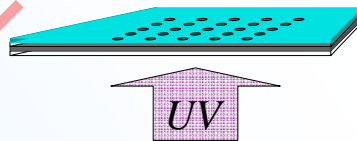
## What they can do:

### Patterns and arrays by lithographic electro formation and UV-cure development

- Electrohydrodynamics allow dielectric polymers to grow towards a (structured) electrode and enforce a lithographic image of this structure into the polymer film
- Can overcome size limitations concerned with photolithography

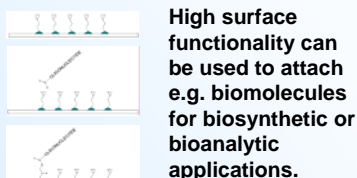


### Surface functionalisation



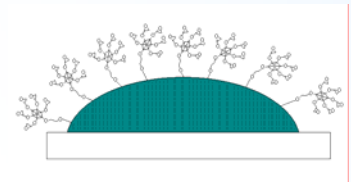
- Polymerisation kinetics of the HTP materials have been fully investigated.
- “Bottom up” curing method is used to attach polymer to substrate.

→ Uncured polymer is washed off, gelled material stays attached but is undercured; leaving a highly functionalised surface.



High surface functionality can be used to attach e.g. biomolecules for biosynthetic or bioanalytic applications.

Surface functionality and solvent resistance can be enhanced by surface attachment of polyhedral oligomeric silsesquioxanes (POSS).



### Encapsulation of Polyfluorenes

HTP3 allows incorporation of blue and green polyfluorenes without affecting the photoluminescence characteristics.  
 → See Strathclyde Chemistry II



### UV transparent lenses

All HTP materials can be used for focusing or waveguiding UV light. Using self alignment methods or a melt reflow process, the polymer can be shaped into lenses.

