

Synthesis of functionally modified polyetherimides by reduction using sodium borohydride.

Nathalie Dendele^a, Aurelie Leonardi^b, Corinne Routaboul^c, Sophie Franceschi-Messant^a, Emile Perez^a

^a*Laboratoire des I.M.R.C.P., Université Paul Sabatier, 118 Route de Narbonne, Toulouse, 31062, France*

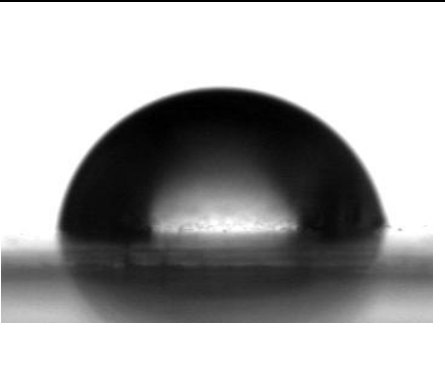
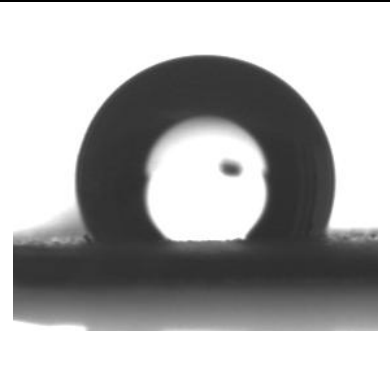

^b*Laboratoire de Physique des Polymères, Université Paul Sabatier, Toulouse, 31062, France*
(perez@chimie.ups-tlse.fr)

Polyetherimide (PEI) is an aromatic polyimide patented by the General Electric Co. in 1973¹. This amorphous thermoplastic polymer combines high strength retention at elevated temperatures, coupled with good resistance to fuels, lubricants, and coolants account for PEI's use in electrical and aerospace applications²⁻³.

Polyetherimide Ultem 1000 was functionalized by reduction of phtalimide groups using sodium borohydride as a mild reducing agent. The new chemical structure of the polymers has been fully analyzed by nuclear magnetic resonance, attenuated total reflectance Fourier transformed infrared, gel permeation chromatography and thermal analysis. The degree of chemical modifications induced more colorful polymers with lower thermal stability. However the surface modification of polyetherimides by reduction appeared as a new and interesting way to prepare more hydrophobic PEI suitable for coating or biomedical applications⁴⁻⁵. The contact angle measurements and infrared spectroscopy mapping confirmed the successful reduction of the upper layer of PEI films.

1. "Method for preparing polyetherimides", US patent N° US05740186, 1973-09-01.
2. Sharma, M.; Rao, I.M.; Bijwe, J. *Wear* **2009**, 267, 839-845.
3. Richardson, T.; Lokensgard, E. *Industrial Plastics: Theory and Application*, 4th Edition, 2003 Thomson Delmar Learning Publisher New York.
4. Peluso, G.; Petillo, O.; Ambrosio, L.; Nicolais, L. *J. Mater. Sci. - Mater. Med.* **1994**, 5, 738-742.
5. Bakeria, Gh.; Matsuurac, T.; A.F. Ismailb, A.F.; Ranac, D. *Sep. Purif. Technol.* **2012**, 89, 160-170.

Table1. Average contact angle data obtained from drops of distilled water for pristine PEI and its derivatives.

			
Contact Angle (°)	$83^{\circ} \pm 1^{\circ}$	$134^{\circ} \pm 4^{\circ}$	$162^{\circ} \pm 3^{\circ}$
Polymer	PEI	PEI-OH2	PEI-OH4