



## Mixed matrix membranes based on hyperbranched polyimide and mesoporous silica for gas separation

Petr Sysel<sup>a,\*</sup>, Evgenia Minko<sup>a</sup>, Michal Hauf<sup>a</sup>, Karel Friess<sup>b</sup>, Vladimir Hynek<sup>b</sup>, Ondrej Vopicka<sup>b</sup>, Krystof Pilnacek<sup>b</sup>, Milan Sipek<sup>b</sup>

<sup>a</sup>Department of Polymers, Institute of Chemical Technology, Technicka 5, 166 28 Prague 6, Czech Republic  
Tel. +420 22044 3196; Fax: +420 22044 3175; email: Petr.Sysel@vscht.cz

<sup>b</sup>Department of Physical Chemistry, Institute of Chemical Technology, Technicka 5, 166 28 Prague 6, Czech Republic

Received 3 September 2010; Accepted 3 January 2011

---

### ABSTRACT

The novel mixed matrix membranes were prepared from the hyperbranched polyimide based on 4,4',4''-triaminotriphenylmethane and mesoporous silica MCM-41 (up to 16 wt.%). The permeability coefficients of hydrogen, carbon dioxide, oxygen, nitrogen and methane in the membranes increased and oxygen/nitrogen or carbon dioxide/methane selectivities decreased slightly with the silica content. The absolute values of permeability coefficients were fairly influenced by the method of additive incorporation to the polymeric matrix.

*Keywords:* Gas permeation; Mixed matrix membrane; Hyperbranched polyimide; Mesoporous silica; 4,4',4''-triaminotriphenylmethane; Oxygen/nitrogen selectivity

---

---

\*Corresponding author.