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## Highly Permeable Polyimide Membranes with a Structural Pyrene Containing *tert*-butyl groups: Synthesis, Characterization and Gas Transport

R. Sulub-Sulub<sup>a</sup>, M.I. Loría-Bastarrachea<sup>a</sup>, H. Vázquez-Torres<sup>b</sup> J. L. Santiago-García<sup>a\*</sup>, M. Aguilar-Vega<sup>a\*</sup>

<sup>a</sup> Unidad de Materiales, Centro de Investigación Científica de Yucatán, A. C., Calle 43 No. 130, 32 y 34, Chuburná de Hidalgo, C.P. 97205, Mérida, Yucatán, México.

<sup>b</sup> Departamento de Física, Universidad Autónoma Metropolitana Iztapalapa, Av. San Rafael Atlixco 186, Col. Vicentina, Apdo. Postal 55-534, C.P 09340, Ciudad de México, México

### Abstract

Three new polyimides with high gas permeability based on a new dianhydride 3,8-di(4-*tert*butylphenyl)pyrene-1,2,6,7-tetracarboxylic DP*t*, containing *tert*-butyl moieties are reported. Chemical structures of the resulting dianhydride monomer and polyimides were confirmed by FTIR and <sup>1</sup>H-NMR. All polyimides show high thermal stability with onset decomposition temperatures above 490°C, and glass transition temperatures above 340 °C. The incorporation of a pendant *tert*-butyl group into the polymer provided high gas permeability with moderated selectivity. The polyimide formed from DP*t* and 2,4,6-trimethyl-*m*-phenylenediamine, DP*t*-TMPD, showed 2035 Barrer CO<sub>2</sub> permeability which could be attributed to its inefficient chain packing from the incorporation of *tert*-butyl groups that increased the polymer *FFV*. The obtained gas permeability coefficients and gas selectivities are similar to those reported for PIM-PI polymers.

### Keywords

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