Synthesis and characterization of new spirobisindane-based poly(imide)s: Structure effects on solubility, thermal behavior, and gas transport properties

Jessop I.A.

Bravo D.

Durán E.

Rodríguez-González F.E.

Tagle L.H.

Coll D.

Ortiz P.

Mirabal Y.

Aguilar-Vega M.

Martin-Trasanco R.

Terraza C.A.

Tundidor-Camba A.

Two new poly(imide)s (PIs) are derived from a biphenylspirobisindane-diamine monomer and the commercial dianhydrides: 4,4?-hexafluoroisopropyliden diphthalic anhydride (6FDA) and pyromellitic anhydride (PMDA). Using polycondensation reactions, these new PIs were synthesized, in high yields (>95%), successfully. The presence of the spirocenter in the main chain of newly synthesized PIs make them soluble in most common organic solvents, whereas the rigidity of the dianhydride monomer makes them be thermically stable at about 500 °C (Td10%). PI derived from 6FDA had 1.2-time higher permeability to the gases, based on gas transport measurements, than those derived from PMDA, which showed slightly higher selectivity values. Nevertheless, both PIs of intrinsic microporosity (PIMs-PI) are more selective to gas pairs, considerably, compared to the previously reported PIs that have same dianhydride in the monomer spirocenter, but instead of biphenyl has an oxodibenzene moiety (PI-1-6FDA) one. In this work, correlation between the structural rigidity of PIMs-PI and their selectivity to the gases (PIM-PI-B > PIM-PI-A >

PI-1-6FDA) is reported. © 2020 Wiley Periodicals, Inc. J. Appl. Polym. Sci. 2020, 137, 48944. © 2020 Wiley Periodicals, Inc.