

### Effect of Methyl Substituents on Gas Permeabilities of DOCD A -ODA -based Co -Polyimides

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We synthesize copolyimides to enhance the transport properties of DOCD A -ODA polyimide prepared previously and investigate the effects of the methyl -substituted phenylenediamines on the gas permeation behaviors. Alicyclic polyimides (PIs) are prepared based on alicyclic dianhydride named as DOCD A and diamines including ODA and 50 mol% of methyl -substituted phenylenediamines of m -TDA, p -DMPD, m -TMPD via one -step polyimidization. The rigid, but nonplanar structures of the polymer including methyl groups make chain packing inefficient, increasing both diffusivity and solubility coefficients of the gases. Synthesis of the copolyimides are characterized by FT -IR and NMR while thermal properties are analyzed by DSC and TGA. All the copolyimides are soluble in most of the common solvents, implicating these polyimides are suitable for membrane fabrication. Thin dense membranes cast from the four copolyimides are tested for their CO<sub>2</sub>/CH<sub>4</sub> gas permeation properties using a time -lag apparatus.