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Previous studies have shown that the gas permeability of nonporous, inorganic-filled glassy polymer mixed-matrix membranes cannot be predicted by the Maxwell model. Nano-sized nonporous fumed silica particles embedded in a glassy polymer matrix have a tendency to form aggregates, which results in disruption of polymer chain packing and creation of excess void space. As a result, the gas permeability generally increases with silica loading, whereas the ideal selectivity for permanent gases is concurrently compromised. This phenomenon has been investigated in our previous study through silica-filled conventional low-free-volume polysulfone membranes. We observed that the relative permeability increased with the penetrants' molecular size, leading to a considerable decrease in the ideal selectivity of gas pairs such as O_2/N_2 and CO_2/CH_4. The increase in relative permeability is substantially influenced by the amount of silica loading. Recently, a new class of glassy ladder-type polymers of intrinsic microporosity (PIM) has been developed. The reported gas separation performances of these new high-free-volume polymers exceed the Robeson upper bound trade- off for O_2/N_2 and CO_2/CH_4. The present work evaluates the gas transport behavior of PIM-1 by incorporation of various amounts of silica nanoparticles. The changes in free volume, as well as the presence and volume of the void cavities were investigated by analyzing the density, thermal stability, and nano-structural morphology. The enhancement in gas permeability (e.g. He, H_2, O_2, N_2, and CO_2) with increasing filler contents shows trends related to the silica volume and void volume fraction. The overall effect of the addition of silica in PIM-1 will be presented and compared with that of low-free-volume polysulfone, as well as high- free-volume PTMSP and PMP. It is expected that these results may provide insights into reverse- selective hybrid membranes for vapor/gas separation applications in future studies.