Title: **High Temperature Hydrocarbon Gas Separation Properties of PBI Membranes**

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Poly(benzimidazoles) (PBIs) are a class of polymer materials that have the potential to improve and expand the applications of commercial gas separation membranes. While many commercial membranes can only perform gas separations up to 100 °C, PBIs are both chemically and thermally stable at temperatures up to 400 °C. An emerging application for these membranes is the high-temperature processes (> 250 °C) for converting shale gas light hydrocarbons to chemicals and transportation fuels using modular, on-site facilities which are being studied by the NSF Engineering Research Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR). Hydrocarbon gas separation properties of Celazole® and sulfonyl-containing PBI membranes have been characterized at temperatures up to 190 °C, which were previously unstudied for ethylene and ethane. At 190 °C, hydrogen/ethane selectivities for Celazole® exceeded 1000 and ethylene/ethane selectivities were around 4. Favorable reductions in the effects of plasticization were observed with increasing temperature. Novel studies of the hydrocarbon permeabilities of sub-micron PBI thin films have also been performed and compared to bulk PBI films.