S2.1.4 SUPPORTED IONIC LIQUID SORBENTS IN GAS POLLUTANT SORPTION IN SIMULATED AIR

Godwin Severa, Scott Higgins, Keith Bethune, Richard Rocheleau
University of Hawaii

Air pollutants such as sulphur dioxide and nitrogen dioxide are detrimental to human health and hinder direct use of air in technologies such as PEM fuel cell systems due to the reaction of the gas pollutants with the fuel cell components. A majority of the state of the art air pollutant mitigation technologies utilize non-regenerable sorbents. These sorbents may generate large amounts of polluted sorbent waste which can lead to environmental contamination. Hence, there is a need to develop alternate sorbent materials with potential for higher performance and regeneration, and ionic liquids offer that promise. Ionic liquids are a class of "green compounds" which have recently received considerable attention in numerous applications due to their negligible volatility, large liquidus range, and tunable chemical properties. There have recently been shown to be capable to partially regeneratively absorb a variety of pollutants through physisorption and chemisorption processes. The practical use of ionic liquids in gas separation is limited by their high viscosity and the small gas-liquid interface which reduces gas diffusion rates through the ionic liquids. In order to mitigate the effects of high viscosity of the ionic liquids, we have prepared ionic liquid loaded activated carbon sorbents by impregnating thin films of ionic liquids onto granulated activated carbon support. We evaluated the ability of the ionic liquids loaded activated carbons to absorb SO2 and/or NO2 at low gas concentrations. Amongst the ionic liquid sorbents studied, the 1-ethyl-3-methylimidazolium acetate loaded activated carbon exhibited the highest gas sorption performance and its performance was further studied under different conditions and characterized by various experimental techniques. The simultaneous sorption of SO2 and NO2 by the supported ionic liquid sorbent was also performed. Furthermore, theoretical studies were performed to determine the favored binding interactions of the ionic liquid and acidic components in challenge gas. Results of this work will be presented.