

## Surface Modification and Characterization of Nano-porous Alumina Membranes for Ion Exchange Applications

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For the last several years, many attentions have been focused on nano-porous alumina membranes because of their unusual properties, which are the pore uniformity, having high pore density, as well as pore diameter controllability. A significant merit of these materials is that they can be modified to have surface charge on nano-pore walls. Our study suggests that prepared nano-porous alumina membranes might be used as ion exchange membranes (IEM). These membranes surfaces with pore size of 20 nm were functionalized by quaternary ammonium cations using silane coupling agents containing one to three amino groups. Ion exchange properties were examined by electrochemical measurements such as streaming potential, dynamic ion transference. Positive zeta-potential increased from 9.6 mV for membranes treated with a single amine group to 17.0 mV for those with three amine groups. The surface areas per attached cation are estimated 230 and 130 nm<sup>2</sup>, respectively. The transport number decreased from 0.86 to 0.84 when the electrolyte concentrations were changed from 1.0 to 64.0 mM.