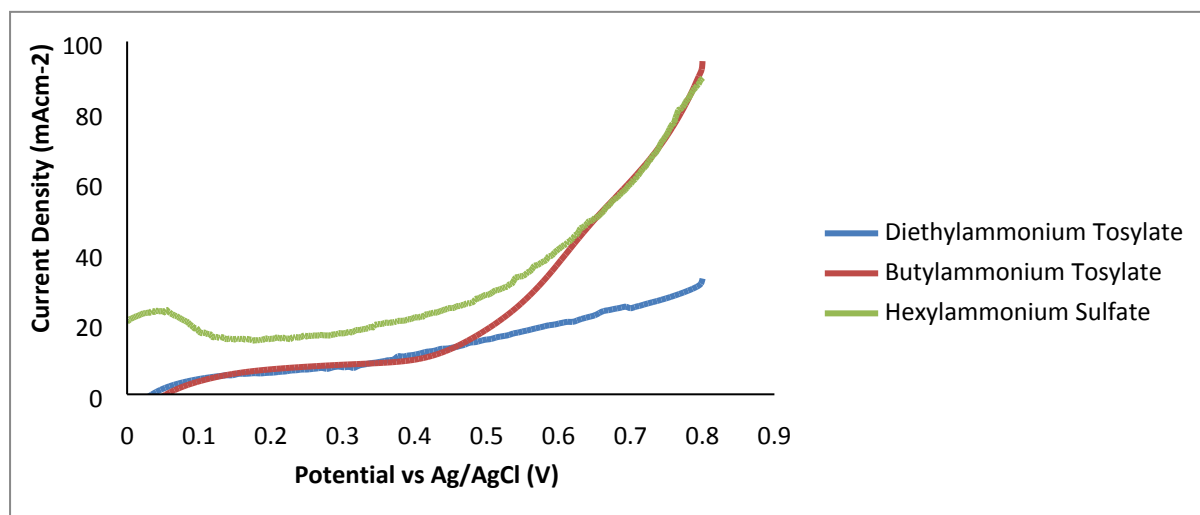


Supplementary Information to accompany

Ion Effects in Water Oxidation to Hydrogen Peroxide

Ciaran McDonnell-Worth^a, Douglas. R. MacFarlane^a



Supplementary Figure A: Cyclic voltammograms of 1M pH10 diethylammonium tosylate, butylammonium tosylate and hexylammonium sulfate electrolytes with a catalytic MnO_x film. Scan rate of 1mVs⁻¹.

Supplementary section B:

This supplementary section provides information about the catalytic manganese oxide films used in the experiments. The technique for making the films and their characterisation were reported by Zhou *et al.*¹. To summarise briefly, by examining EXAFS spectra the films were found to have a birnessite-like structure. Heat treatment of the films (as was performed in this paper) produced a small amount (3-10% of the total manganese) of reduced Mn (Mn^{II} or Mn^{III}) within the film. SEM images of the heat treated films showed a porous and fibrous structure on the surface of the film. Heat treatment was found to reduce the amount of water in the films and cause an 8% weight loss in the films when heat treated at 90 °C for 30 minutes. Improvement in the catalytic activity for water oxidation to O₂ in aqueous, inorganic electrolytes over non-heat treated films was attributed to the increase in carrier density and surface mobility caused by the loss of water and hydroxyl groups on the surface of the film.

1. F. Zhou, A. Izgorodin, R. K. Hocking, V. Armel, L. Spiccia and D. R. MacFarlane, *ChemSusChem*, 2013, **6**, 643-651.