

For the improvement of rate performance of carbon electrodes, new electrode surfaces, such as Three-Dimensionally Ordered Macroporous (3DOM) carbon electrodes, are being studied in order to understand their electrochemical properties. The 3DOM carbon electrodes have a greater surface area that allows more charge-transfer reactions to take place, and have high energy density. These characteristics should be useful in the development of sensors/biosensors with enhanced rates of electron transfer. In order to use the electrodes for aqueous solutions, an acid pretreatment was used to help create more "oxide defects" on the surface, therefore making the surface more hydrophilic to allow metal complexes to have better contact with the surface. This results in better electron transfer between the electrode surface and 3DOM electrode. Based on the Randles-Sevcik equation (derived from the Nernst-Planck equation), the 3DOM electrodes have shown results similar to that of results with glassy carbon electrodes, but with enhanced electron transfer rates.