

HYDROGEL BASED MICRO AG/AGCL REFERENCE ELECTRODES. QUICK PROTOTYPING OF REFERENCE ELECTRODES

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Electrochemical measurements are based on the control or observation of potential at the working electrode, for that purpose an electrode of constant potential is needed. Reference electrode (RE) has a fixed potential and this potential does not change as current flows through it. One of the most popular RE is Ag/AgCl electrode. Ag/AgCl RE is often used for electrochemical measurements due to simplicity, inexpensive design, and nontoxic components. These RE are commercially available in various shapes, sizes, junctions and other parameters. However when developing an electrochemical device prototypes there can rise necessity to make unconventional shape or size RE.

Here we explore applicability of RE membrane preparation from polyacrylamide hydrogel. During experimenting we observed almost excellent electrochemical performance of “in house” made RE compared with several commercially available ones. The electrode potential difference was 40 mV versus the calomel electrode and 7 mV versus the commercial Ag/AgCl electrode. On the other hand polyacrylamide membranes have porous micro/nano structure with varying pore sizes, which was observed with scanning electron microscopy. Observed porous structure does not permit leakage of inner chloride ions, as chloride flux was evaluated. Permeability to chloride ions doesn't make polyacrylamide hydrogel an ideal membrane in long term experiments. Though as membranes are quickly and easily prepared it is ideal candidate for quick electrochemical system designing and testing even possible application in disposable one time use devices.