

# Supporting Information

Fig S1-5

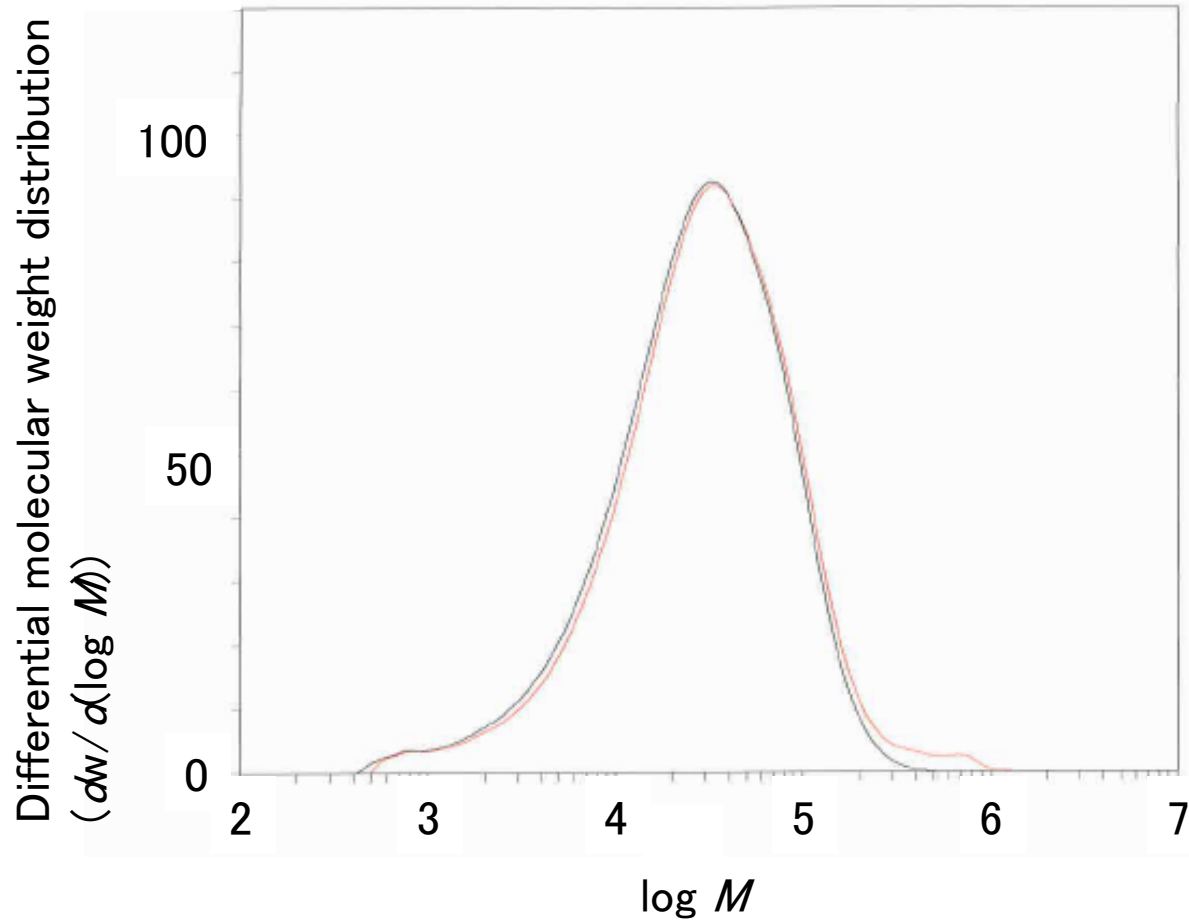


Fig. 1S Molecular weight distribution curves of aqueous solutions containing 1% PVA (black line) and mixtures of 1% PVA and a color extender (E201) containing 10-14% acrylic resin at 1:0.01 weight ratio (red line), obtained by a GPC analysis. The curves showed a shift toward higher molecular weight by the extender. This indicates that PVA may be cross-linked partly through esterification with aclyic resin.

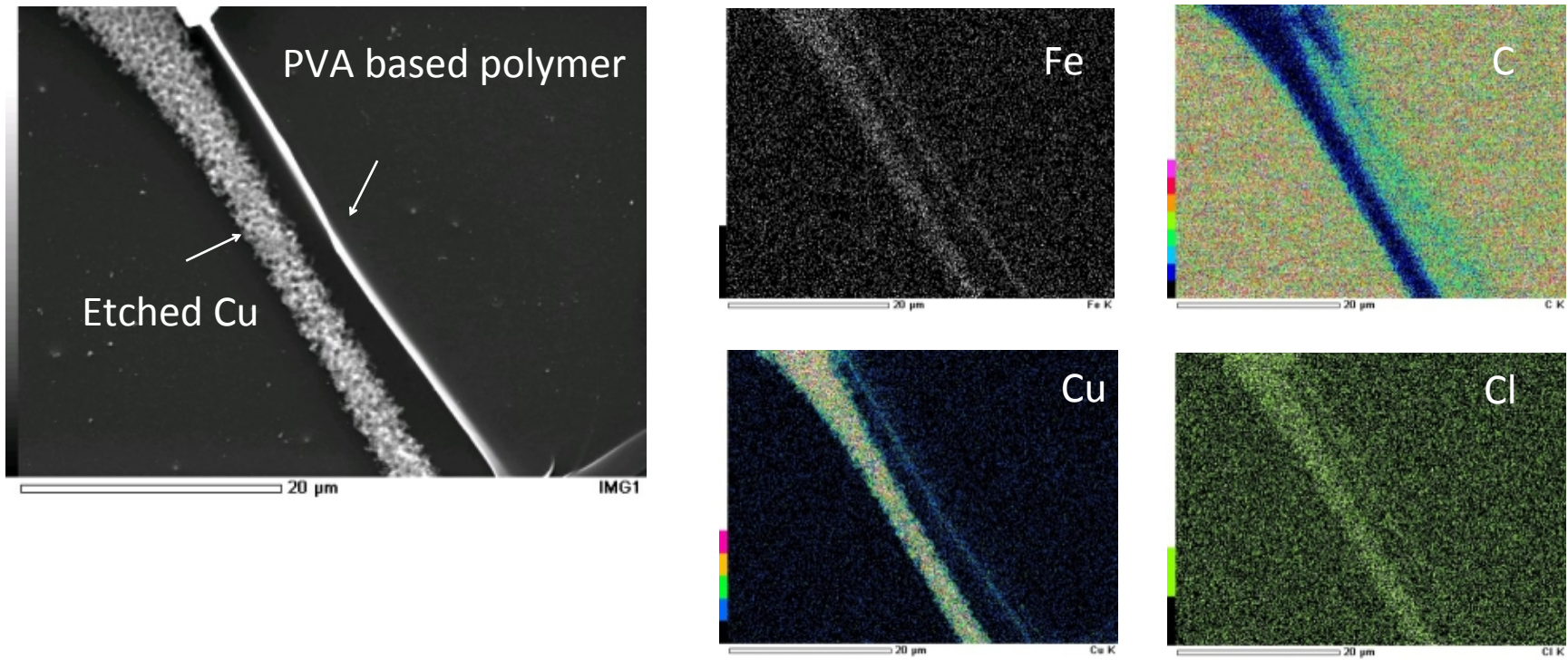


Fig. 2S. SEM-EDX analysis for the part of the etched Cu surface where the PVA based polymer happened to be slipped off in order to distinguish the elements in between the Cu surface and the polymer. The EDX showed that no CuCl was detectable in the completely etched area. Trace amounts of Fe, Cl, Cu elements were observed in the polymer, revealing that some etching process was occurred through the polymer.

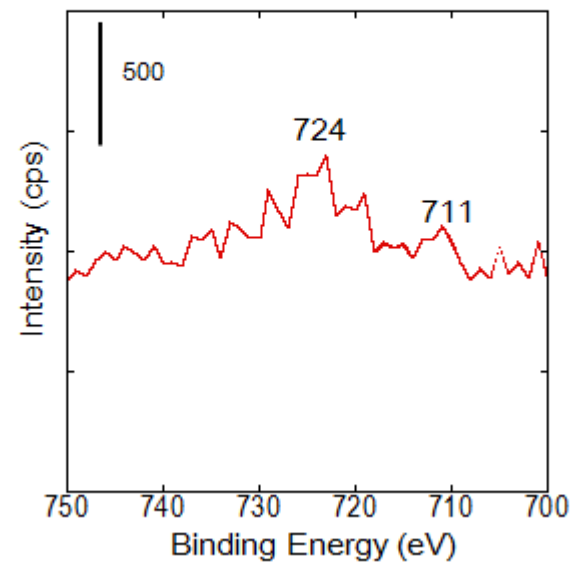
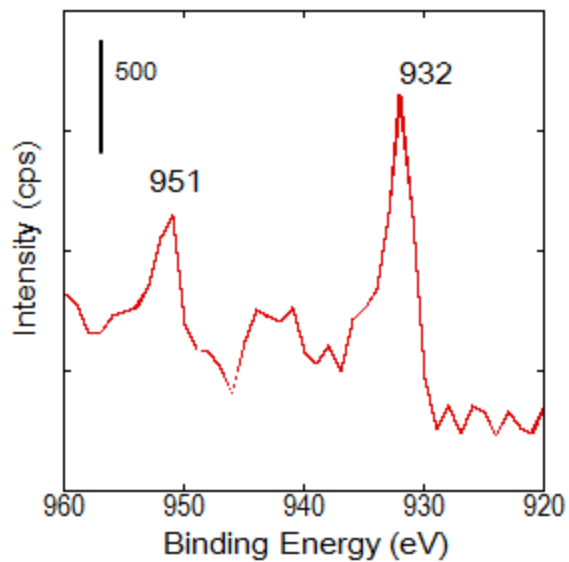


Fig. 3S. XPS images of Cu (2p) region (left) and Fe (2p) region (right) of a PVA-coated Cu grid electrodes. A trace amount of Fe (III) was observed.

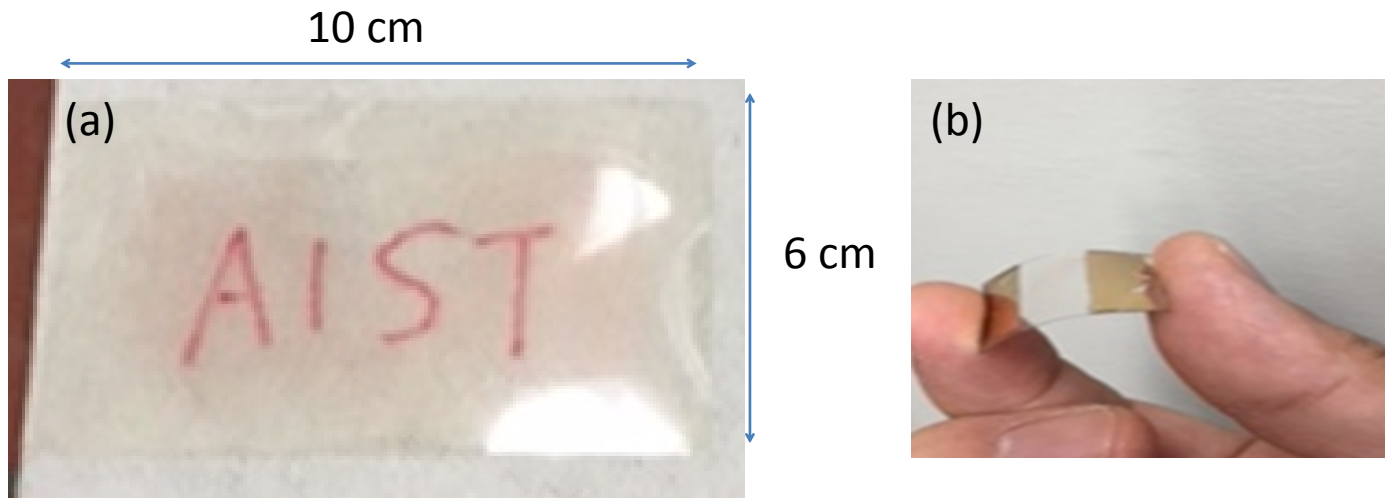


Fig. 4S. Photos of transparent Cu grid electrodes. The left image (a) shows a relatively large size of the electrode (6cm x 10 cm). The right image (b) is a bended Cu electrode with sputtered Au pads at the ends.

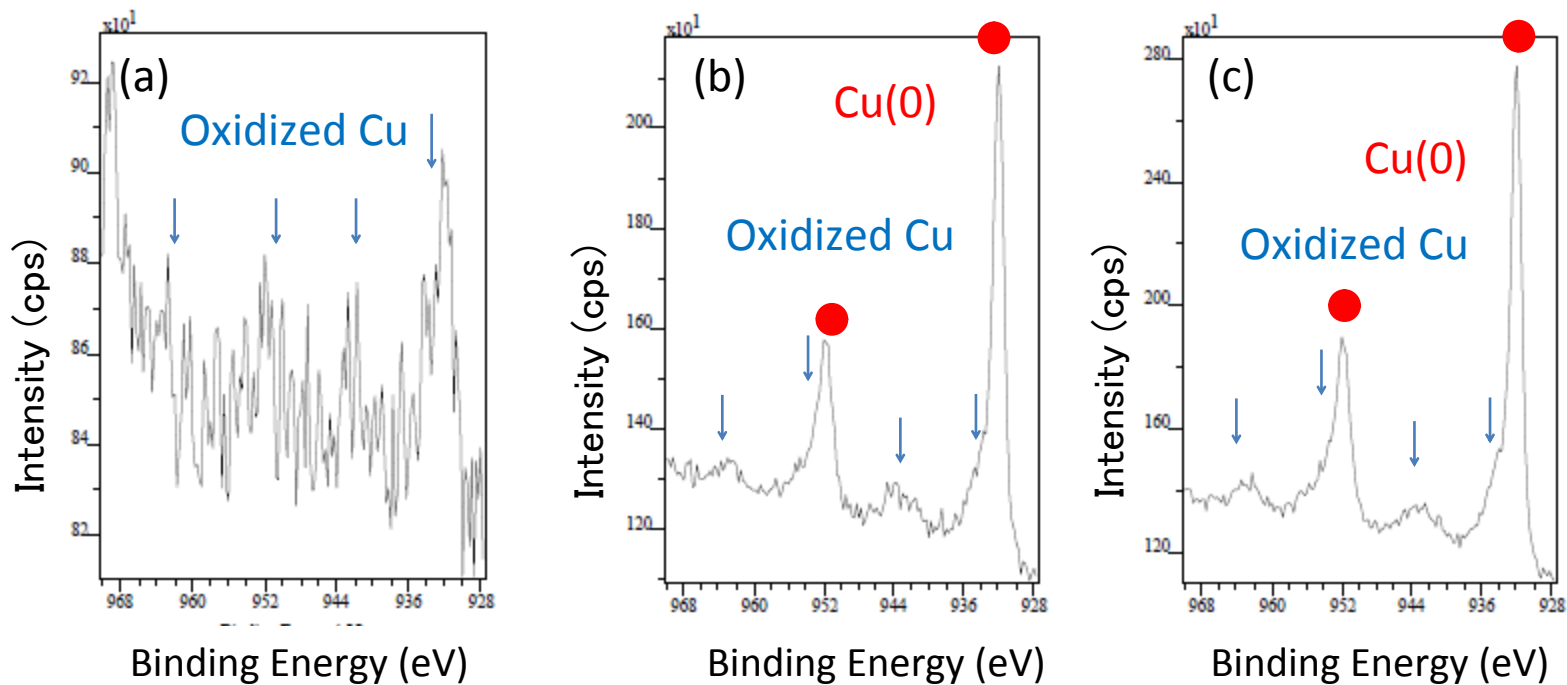


Fig. 5S. XPS images of Cu (2p) region for Cu grid electrodes with (a) and without (b) PVA removal treatment after heating at 200 °C for 60 min, and without PVA removal treatment before heating (c). All the measurements were done after the removal of PVA.