

Description of Additional Supplementary Files

Supplementary Movie 1: Dynamic restructuring of N-Cu SAC at -1.1 V vs RHE in electrolyte.

Supplementary Movie 2: N-Cu SAC at -1.1 V vs RHE in electrolyte for longer duration.

Supplementary Movie 3: N-Cu SAC at -0.6 V vs RHE in electrolyte.

Supplementary Movie 4: Control experiment without applying cathodic potentials in electrolyte.

Supplementary Movie 5: Control experiment without introducing electrolyte.

Supplementary Movie 6: Effect of electrolyte flow on the bubble movement during reaction.