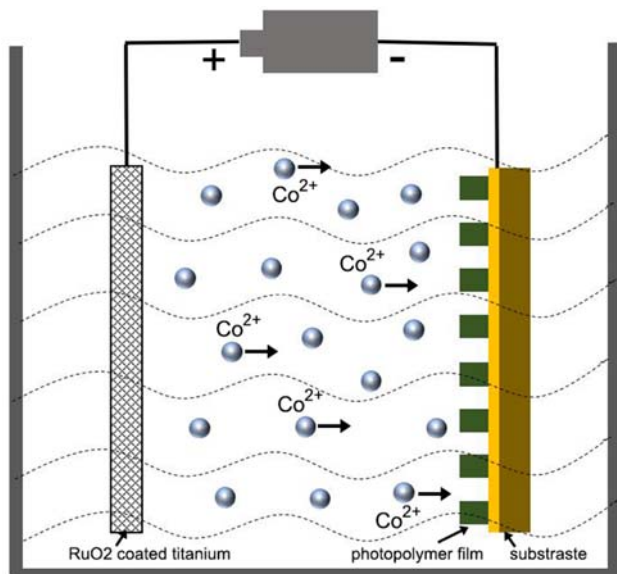
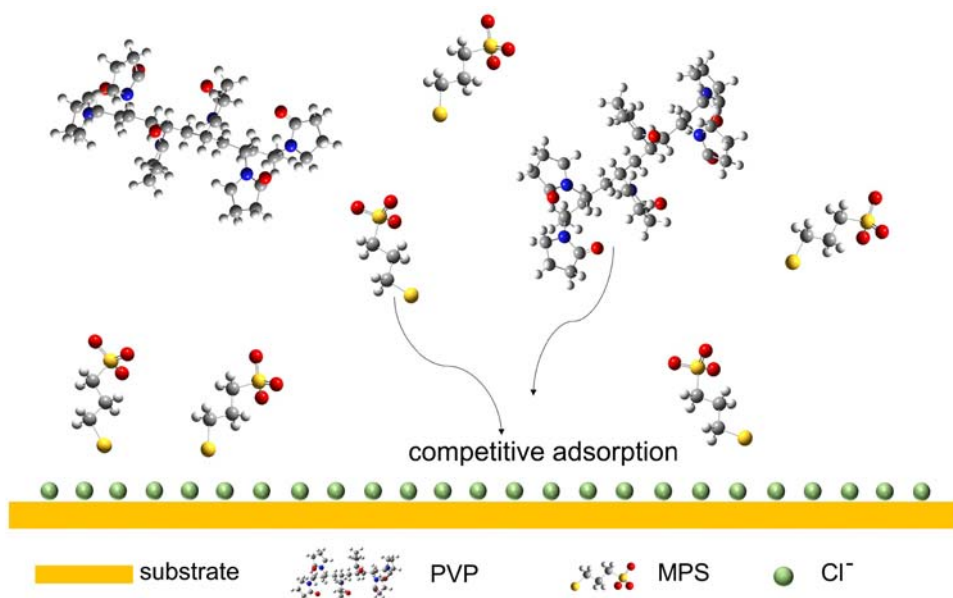


## Supplementary materials



**Figure S1:** Schematic diagram of cobalt electrodeposition.



**Figure S2:** Schematic diagram of competitive adsorption in the solution with MPS and PVP. The cobalt electrodeposition was conducted in the bath and the cobalt pillar was fabricated in the solution with competitive adsorption of MPS and PVP. Chloride ions adsorb on the surface and accelerate the adsorption process of additives in the solution.