

As mentioned in the manuscript, we provided all relaxed neb images in this SI. The figure S1 provides the neb images from COS^* to $\text{CO}^* + \text{S}^*$ step and $\text{CO}^* + \text{S}^*$ to $\text{CO}_2^* + \text{S}^*$ step with and without sulfur surface dopant and oxygen vacancies introduced CuO(111) surface. All initial states of COS^* include additional oxygen vacancy to provide an active site for a sulfur from COS dissociation step.





