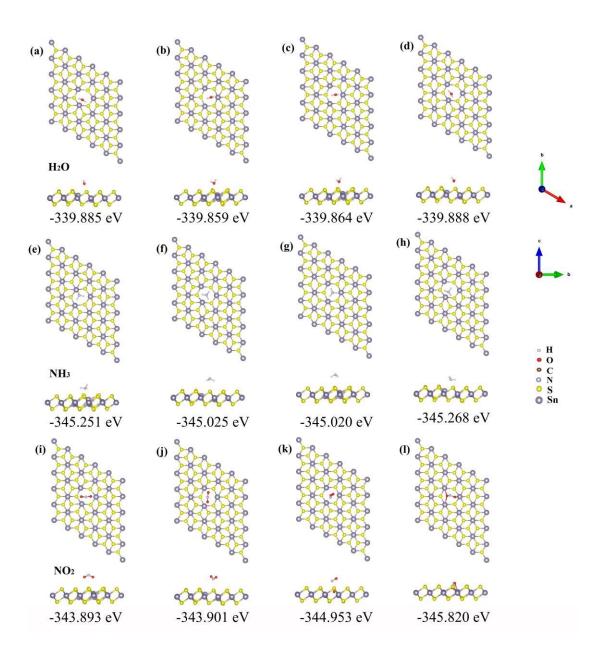
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## **Supplementary materials**



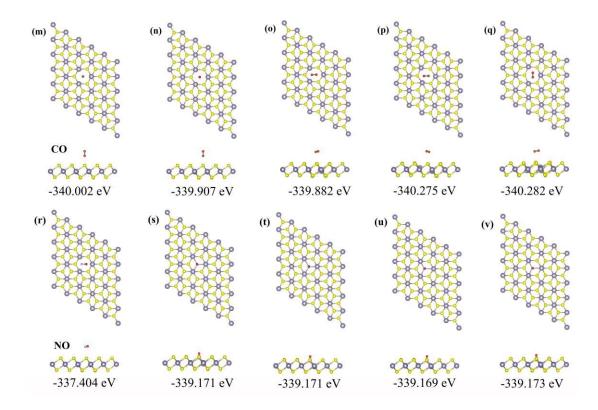


Figure S1. The models for gas molecule adsorbed s-vacancy  $SnS_2$  monolayer systems in different configuration with corresponding adsorption energy.