Table S1: Relationship between surface strategies and photocatalytic CO_2 reduction properties in 2D materials (Green rectangles represent applicable strategies)

CO_2 reduction / *Surface Strategies*	*CO_2 adsorption*	*Light utilization*	*Carriers separation*	*Carriers Transfer*	*CO_2 Activation*	*Selectivity*	*Products desorption*
Defect Engineering	■	■	■	■	■		
Heteroatom Engineering		■	■			■	
Composite	■		■		■	■	
Surface molecular functionalization	■						

Table S2: Relationship between surface strategies and electrocatalytic CO_2 reduction properties in 2D materials (Green rectangles represent applicable strategies)

CO_2 reduction / *Surface Strategies*	*CO_2 adsorption*	*Conductivity*	*Activation barrier*	*Intermediate Stabilization*	*Selectivity*	*Products desorption*
Defect Engineering	■	■	■	■	■	
Heteroatom Engineering					■	
Composite		■	■	■	■	
Surface molecular functionalization	■					■
Surface alloy				■		■