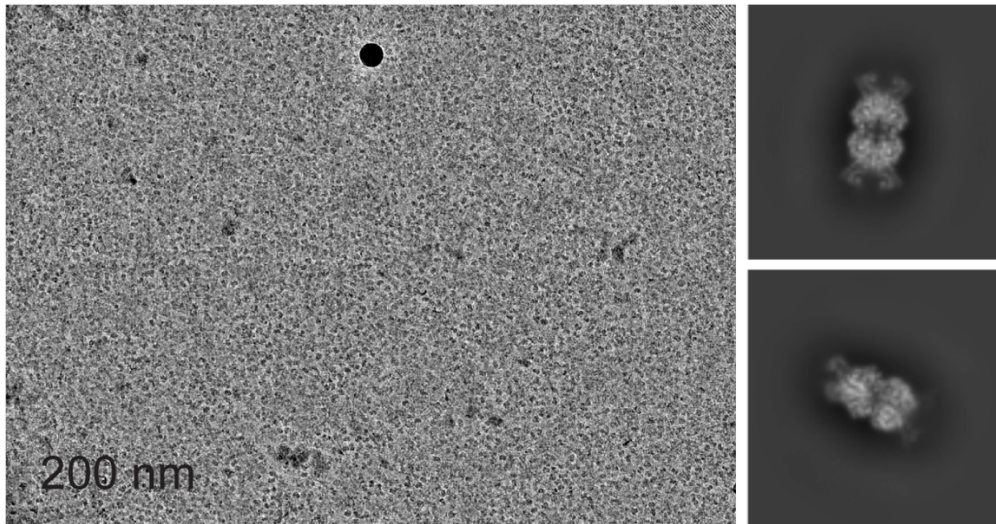
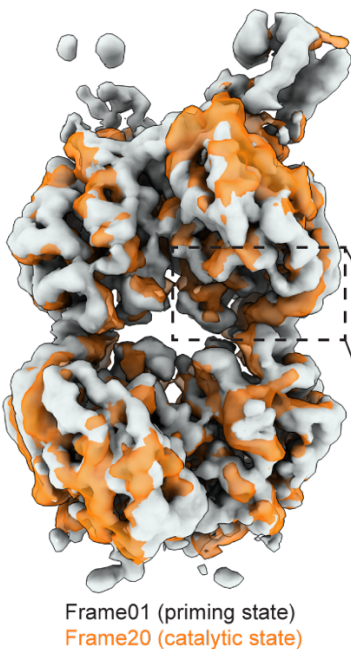
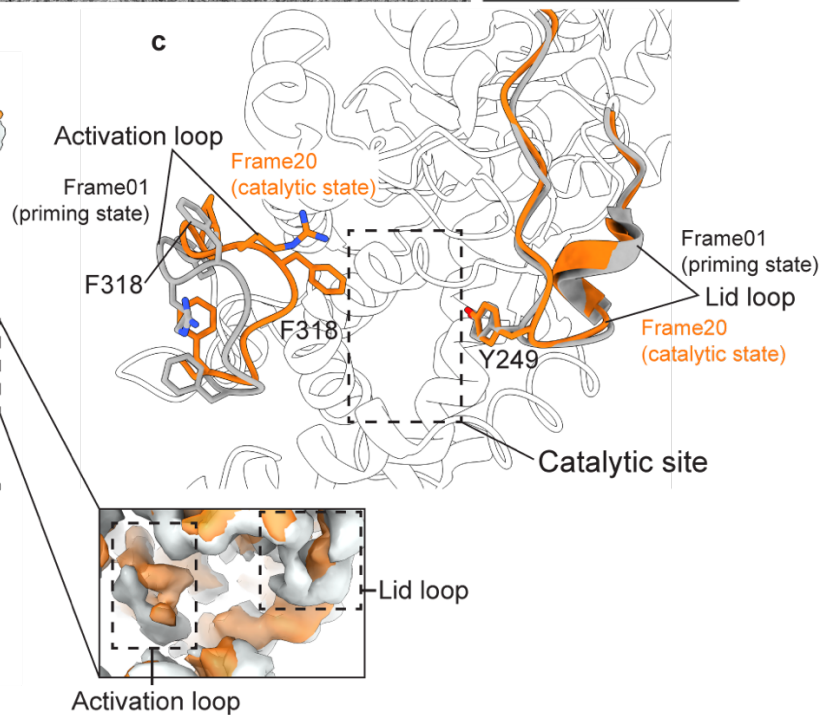


a**b****c**

3D variability analysis of GAC reveals dynamic priming state. (a) A representative cryo-EM micrograph shows that GAC mutant (10 μ M) mixed with glutamine (20 mM) and phosphate (100 mM) does not form filament (left). Representative 2D classes show tetrameric GAC N375A mixed with glutamine and phosphate (right). (b) Overlap of the first frame (01st, gray, priming state) and the last frame (20th, orange, catalytic state). Zoom-in inset: the comparison of activation loop and lid loop within two states. (c) Atomic models built based on the priming state and catalytic state show dramatic changes in the activation loop but subtle changes in the lid loop, indicating the dynamic activation loop as the gate for substrate and product channeling.