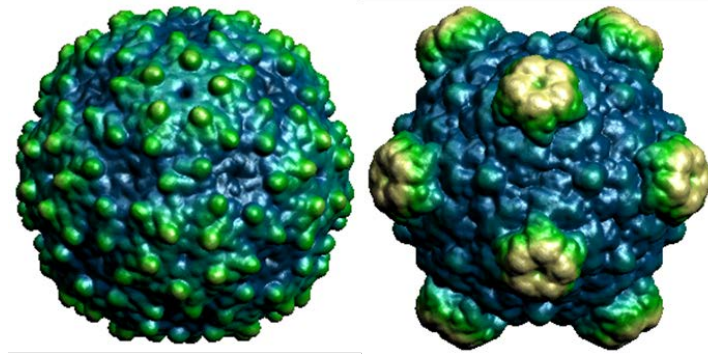
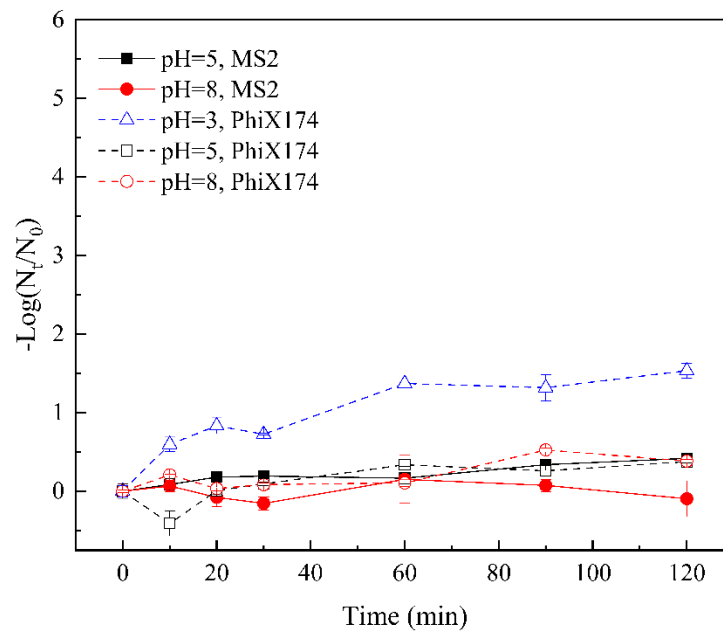


## Supplementary Information



**Fig. S1** The structure images of phage MS2 (left) and PhiX174 (right).



**Fig. S2** The bacteriophage inactivation of blank control group under different pH values. Initial conditions:  $T = 25\text{ }^{\circ}\text{C}$ , shaking frequency = 100 rpm, bacteriophage concentration:  $10^6$  PFU/mL.