

## **Description of Additional Supplementary Files**

File Name: Supplementary Data 1

Description: Strains and plasmids used in this study.

File Name: Supplementary Data 2

Description: Primers used in this study.

File Name: Supplementary Movie 1

Description: The conformational opening and closing changes of unbound-CM in the 1000 ns molecular dynamics simulation (MDS).

File Name: Supplementary Movie 2

Description: The 1000 ns-MDS process of unbound-CM: THP binary complex. The triple helical collagen is close to the catalytic center of the peptidase domain with the conformation closing of CM.