

# **Dynamics and mechanism of water-protein interactions**

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**Abstract:** Water is a universal lubricant in life and plays a critical role in biomolecular structure, dynamics and function. Here, we report the systematic characterization of water motions around protein surfaces and protein-DNA interfaces in real time. Hydration water is found to strongly slave protein fluctuations on the ultrafast time scale. A series of correlations between the dynamics and protein properties was observed. These results revealed the wide range of heterogeneous water dynamics on the picosecond time scales but are well correlated with the protein structures, dynamics and even function. Such water dynamics could be general at any other nanointerfaces.