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Infrared Structural Biology: Detect Functionally Important Structural Motions of Proteins¹

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Proteins are dynamic. Lack of dynamic structures of proteins hampers our understanding of protein functions. Infrared structural biology (IRSB) is an emerging technology. There are several advantages of IRSB for mechanistic studies of proteins: (1) its excellent dynamic range (detecting structural motions from picoseconds to \geq seconds); (2) its high structural sensitivity (detect tiny but functionally important structural motions such as proton transfer and changes in hydrogen bonding interaction); (3) its ability to detect different structural motions simultaneously. Successful development of infrared structural biology demands not only new experimental techniques (from infrared technologies to chemical synthesis and cell biology), but also new data processing (how to translate infrared signals into quantitative structural information of proteins). These topics will be discussed as well as examples of how to use IRSB to study structure-function relationship of proteins.

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