

Conformational Diversity and Sub-states in Enzyme Catalysis

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Objectives

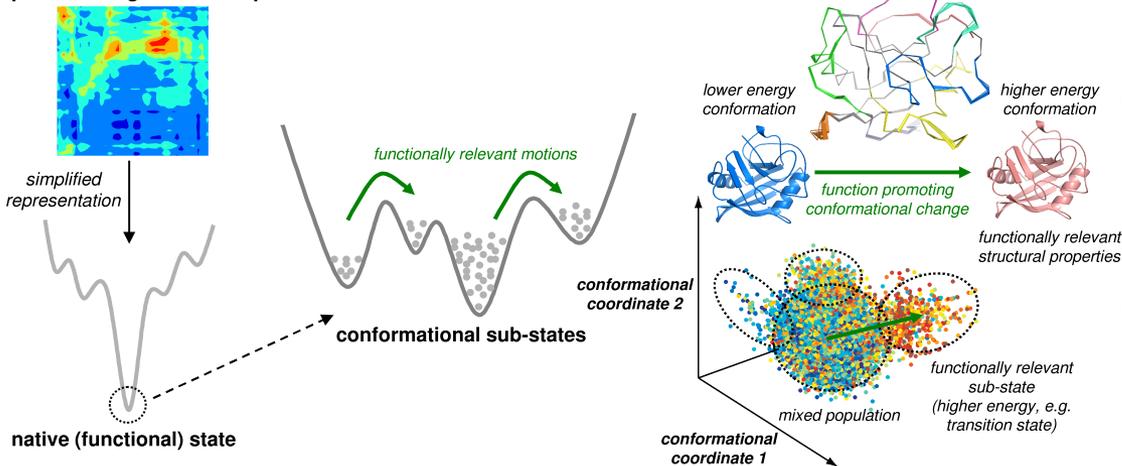
- Develop and apply computational methods for understanding conformational diversity and sub-states in enzyme function
 - Identification of conformational sub-states associated with enzyme function including catalytic efficiency
 - Develop a hyper-catalytic enzyme engineering approach through conformational modulation

Impact

- Developed Quasi-anharmonic analysis (QAA) approach for identification of sub-states
- Identification of conformational sub-states associated with enzyme rate-kinetics
- Successfully engineered and tested an enzyme that shows ~3000% increase in enzyme activity

Accomplishments: Identification of conformational sub-states in enzyme catalysis

protein energetic landscape



Accomplishments

- Patent:**
- Identification and Modification of Dynamically Active Protein Residues*, Inventor: Pratul K. Agarwal, US Patent # 8,417,461, Issued 04/09/2013.
- Publications:**
- Agarwal, P. K.***; Schultz, C.; Kalivreteno, A.; Ghosh, B.; Sheldon, B., "Engineering a hyper-catalytic enzyme by photo-activated conformation modulation", *J. Phys. Chem. Lett.* (2012), **3**, 1142-1146
- Ramanathan, A.; Savol, A.; Burger, V.; Chennubhotla, C. S.*; **Agarwal, P. K.***, "Protein Conformational Populations and Functionally Relevant Sub-states", *Accounts of Chemical Research* (2013). Accepted. (Impact Factor: 20.83)



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