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Ballistic Motion of Enzymes that Catalyze Highly Exothermic Reactions KONSTANTINOS TSEKOURAS, STEVE PRESS, IUPUI — Recently we proposed that the experimentally observed enhanced diffusion of enzymes catalyzing highly exothermic reactions is a consequence of their mechanism for dissipating reaction energy. More specifically, we proposed that reaction energy spreads out from the reaction site in the form of an acoustic wave which causes the enzyme to asymmetrically deform into the solvent. The solvent reaction propels the enzyme. However, it has been noted that in water, high viscosity should reduce enzyme momentum to zero within a few *ps*, so any diffusion increase should not be observable. Here we provide a model explaining how small volumetric expansions of biomolecules inside water may cause fluid compression that in turn creates regions of low fluid density around the biomolecule. We then investigate the dynamics of the biomolecule in the presence of these perturbations.

Konstantinos Tsekouras
IUPUI

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