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The effects of bound state motion on macromolecular diffusion LOREN HOUGH, MICHAEL STEFFERSON, University of Colorado, Boulder, SAMANTHA NORRIS, Cornell University, LAURA MAGUIRE, FRANCK VERNEREY, MEREDITH BETTERTON, University of Colorado, Boulder — The diffusion of macromolecules is modified in crowded environments by both inert obstacles and interaction sites. Molecules are generally slowed in their movement inducing transient anomalous subdiffusion. Obstacles also modify the kinetics and equilibrium behavior of interaction between mobile proteins. In some biophysical contexts, bound molecules can still experience mobility, for example transcription factors sliding along DNA, membrane proteins with some entry and diffusion within lipid domains, or proteins that can enter into non-membrane bound compartments such as the nucleolus. We used lattice and continuum models to study the diffusive behavior of tracer particles which bind to obstacles and can diffuse within them. We show that binding significantly alters the motion of tracers. The type and degree of motion while bound is a key determinant of the tracer mobility. Our work has implications for protein-protein movement and interactions within living cells, including those involving intrinsically disordered proteins.

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