

# Step into the Unresolved: A New Dimension in Real-time Single-molecule Biology

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Single-molecule and single-cell technologies offer exciting opportunities for direct, and real-time observation and measurement of protein function, activity and structures, or their interactions with DNA and RNA. The C-Trap™ technology integrates optical tweezers, confocal/STED microscopy, and an advanced microfluidics system enabling live-correlative visualization and manipulation of molecular interactions with sub-piconewton force resolution and a kilo- to megahertz temporal resolution. Label-free Interference Reflection Microscopy or TIRF microscopy can also be integrated, further enabling the visualization of surface assays such as unlabeled microtubule and motor-protein interactions. Here, we present how such advances allow for the measurement of conformational changes of individual proteins folding and unfolding; protein droplet fusion during liquid-liquid phase transitions and aggregation dynamics; DNA-protein interactions and genome modifications; effects of mechanical stress on DNA/RNA structure; motility of cytoskeletal molecular motors; cell receptor force activation; as well as various other intracellular dynamic processes.