

Protein dance on nanoparticle surface revealed


NMR technique glimpses ubiquitin dynamics on nanoparticle

By *Stu Borman*

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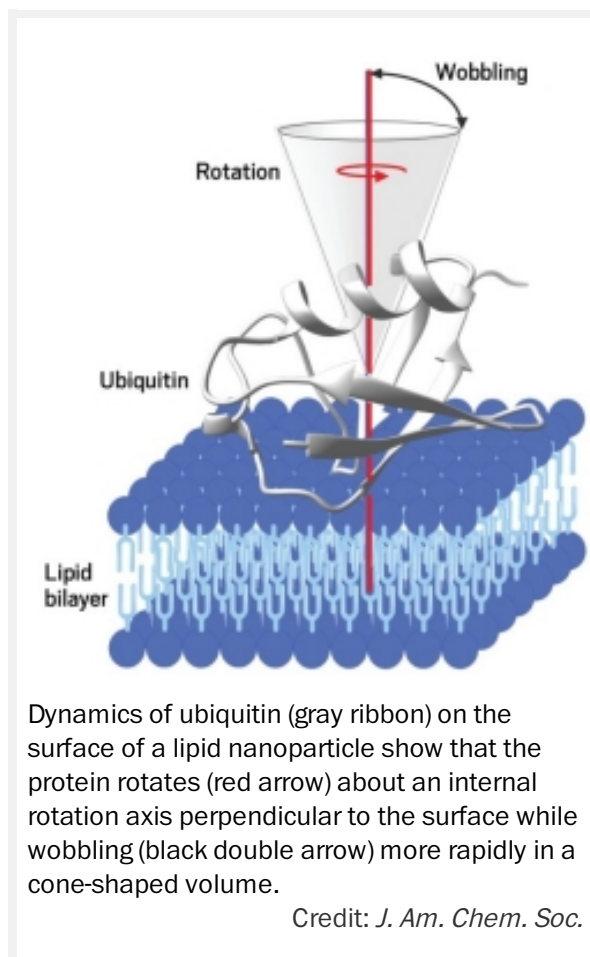
All Concentrates

The growing use of nanomaterials in biomedical applications makes understanding nanoparticle-protein interactions an important goal. Nuclear magnetic resonance spectroscopy is a promising way to probe such

interactions. But because of the huge size difference between nanoparticles and proteins, protein peaks

disappear in nanoparticle NMR spectra, making the interactions invisible. **G. Marius**

Clore <<http://spin.niddk.nih.gov/clore>>, Vitali Tugarinov, and coworkers at the National Institute of Diabetes & Digestive & Kidney Diseases have now developed an NMR technique that can image protein dynamics on lipid-based nanoparticle surfaces (*J. Am. Chem. Soc.* 2016, DOI: [10.1021/jacs.6b02654](https://doi.org/10.1021/jacs.6b02654) <<http://cgi.cen.acs.org/cgi-bin/cen/trustedproxy.cgi?>



redirect=<http://pubs.acs.org/doi/abs/10.1021/jacs.6b02654?source=cen>). They made the advance after recognizing that NMR properties of nanoparticle-bound proteins depend on nanoparticle size. By analyzing changes in NMR “exchange lifetime broadening” when ubiquitin binds different-sized nanoparticles, the researchers found that the protein rotates in microseconds around an internal axis approximately perpendicular to nanoparticle surfaces while wobbling in nanoseconds in a cone centered on the axis. The approach “shows the power of NMR to unravel atomic-level details of protein states,” comments **Hanudatta S. Atreya** <<http://nrc.iisc.ernet.in/hsa/>> of the Indian Institute of Science. “No other technique can provide this information in such detail.”

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