**Scientific Achievement**

Lanthanide binding tags (LBTs) were used to image an individual membrane protein in bacteria in 3-D with a sub 15-nm X-ray beam.

**Significance and Impact**

The combination of LBTs and X-ray microscopy has the potential to become a widespread tool for imaging individual proteins in whole cells and tissues at the resolution of the cell membrane and subcellular organelles.

**Research Details**

- Lanthanide binding tags (LBTs) are short peptides with a high-affinity lanthanide-binding domain.
- They can be genetically “fused” with any protein of interest to generate an X-ray-sensitive protein tag.
- X-ray fluorescence nanotomography was used at the HXN beamline at NSLS-II and the APS Bionanoprobe to simultaneously image the protein of interest along with the trace element composition in the cell.


Work was performed in part at Brookhaven National Laboratory.