



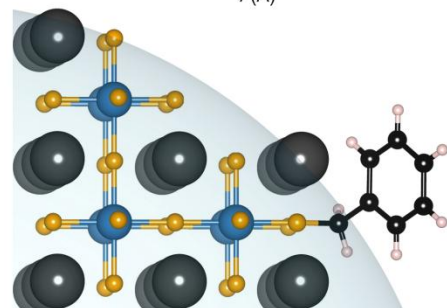
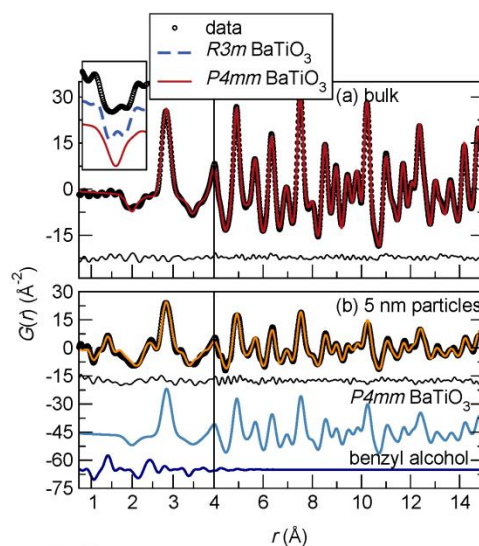
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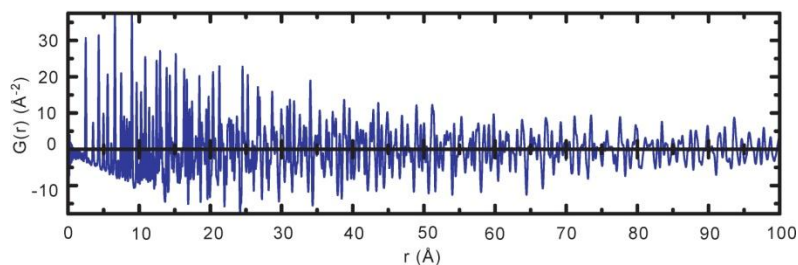
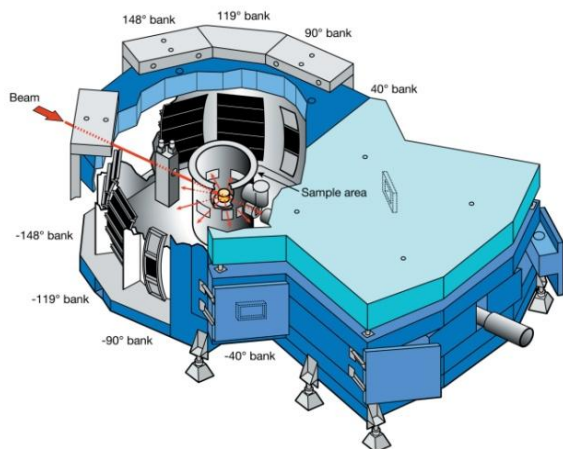
## Neutron Powder Diffractometer (NPDF)

The Neutron Powder Diffractometer (NPDF) is a high-resolution total-scattering powder diffractometer located at Flight Path 1, 32 meters from the spallation neutron target. It has 20 detector panels with 160 position-sensitive detectors in the backscattering region of the instrument. These specifications give the instrument a high resolution and a large  $Q$ -range, and together with low and stable background scattering, position NPDF as a world-leader in pair distribution function (PDF) studies of disordered and nanocrystalline materials. A standard data set suitable for PDF analysis can be obtained in only two hours. NPDF is equally well-suited for high-resolution crystallographic studies. NPDF experiments have resulted in more than 110 peer-reviewed journal articles since the instrument shutter opened in 2002, in fields as diverse as geochemistry, actinide research, complex oxides, bulk metallic glasses, and hydrogen storage materials. Additionally, NPDF serves a key role as a development platform for local structure analysis. Go to <http://totalscattering.lanl.gov> for science highlights and links to publications, tutorials, and analysis tools.

Specifications				
Moderator	Chilled Water (283 K)			
Flight path	Primary: 32 m, secondary: 1.5 m			
Beam Size	5 cm high x 1 cm wide			
Detector Bank Information				
Bank	$\pm 45^\circ$	$\pm 90^\circ$	$\pm 119^\circ$	$\pm 148^\circ$
d-spacing	0.25 - 7.2 Å	0.17 - 4.2 Å	0.14 - 3.4 Å	0.24 - 3.0 Å
Q	0.8 - 25.0 Å <sup>-1</sup>	1.5 - 37.6 Å <sup>-1</sup>	1.8 - 45.8 Å <sup>-1</sup>	2.1 - 51.1 Å <sup>-1</sup>
$\Delta d/d$	0.70 %	0.31 %	0.28 %	0.15 %
Detector type	62 <sup>3</sup> He Tubes	62 <sup>3</sup> He Tubes	80 <sup>3</sup> He Tubes	80 <sup>3</sup> He Tubes
Pixels	62	62	4000	4000
Pixel size (w x h)	0.5" x 12"	0.5" x 12"	0.5" x 12"	0.5" x 12"
Ancillary Equipment				
Displex	15 - 600 K (closed cycle refrigerator)			
Furnace	RT - 1100 °C			
Other	Contact instrument scientist			



Fits for (a) bulk BaTiO<sub>3</sub> and (b) 5 nm particles of BaTiO<sub>3</sub> data. NPDF provides access to both the oxide and ligand structure of the nanoparticles.



PDF of Nickel extending out to a distance of  $r = 100$  Å.