

INSTRUMENT

BEAM LINE

4A

SPALLATION NEUTRON SOURCE

Fact Sheet



MAGNETISM REFLECTOMETER

The Magnetism Reflectometer is dedicated to reflectometry studies of magnetic thin films, superlattices, and nanoscale structures. The combination of the high-power SNS and the use of advanced neutron optics and the position sensitive detector allows for off-specular scattering and grazing incidence small angle scattering studies of in-plane magnetic and nonmagnetic structures. The flexibility of the instrument is achieved by a quick switch between polarized and unpolarized configurations of the incident neutron beam. The incident beam is polarized using the bender polarizer or the single supermirror polarizer. Polarization analysis is performed using one of the two state of the art devices, the FAN supermirror analyzer or ^3He in-situ pumping filter. Wide-angle diffraction geometry is available for experiments on thin films and multilayers. The availability of polarized neutrons and polarization analysis suggests that this instrument can also be used for specific studies of nonmagnetic thin-film samples. Examples of the latter include contrast variation, incoherent background reduction, and phase determination for direct inversion of reflectivity data into real-space scattering-length density profiles.



SPECIFICATIONS

Source-to-sample distance	18.703 m
Sample-to-detector distance	2.450 - 2.580 m
Detector size	21 x 18 cm ²
Detector resolution	1.5 mm
Moderator	Coupled supercritical hydrogen
Bandwidth	$\Delta\lambda = 2.74 \text{ \AA}$
Wavelength range	$1.8 \text{ \AA} < \lambda < 14.0 \text{ \AA}$
Q range	$0 \text{ \AA}^{-1} < Q < 6 \text{ \AA}^{-1}$
Magnetic field max	1.2 T with a gap of 50 mm and 3 T with a gap of 10 mm
Polarization	98.5%
T range	5 - 750 K
Minimum reflectivity	10^{-8}

Status: Available to users

APPLICATIONS

The Magnetism Reflectometer is applicable primarily to studies with thin magnetic films, an increasingly important area of solid-state physics. Experiments could also benefit engineering, metallurgy, or biological problems. Instrument capabilities allow, for example, studies of magnetic recording media and magnetic sensors, as well as depth-dependent studies of structural/magnetic nanoparticles or domains. The instrument's unique capabilities provide for multilength-scale experiments, and it has sufficient beam intensity for detailed structural/magnetic phase-diagram determinations. The Magnetism Reflectometer provides a broad variety of the sample environment and experimental conditions with external magnetic field, broad temperature range and electric field.

FOR MORE INFORMATION, CONTACT

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