

EFFECT OF BEAM DIVERGENCE ON STRAIN DATA FROM NEUTRON DIFFRACTION

E. Üstündag¹, Richard A. Karnesky¹, I. C. Noyan², Mark A.M. Bourke³ and Donald W. Brown³

¹ Department of Materials Science, California Institute of Technology, Pasadena, CA 91125,
USA

² IBM Research Division, T.J. Watson Research Center, Yorktown Heights, NY 10598, USA

³ Materials Science and Technology Division, Los Alamos National Laboratory, Los Alamos,
NM 87545, USA

Incident beam divergence is a well known source of systematic error in diffraction. Its effect on the precision and accuracy of diffraction data collected with monochromatic X-rays was recently investigated [1]. This study clearly revealed that highly divergent incident X-ray beams can lead to large errors when used on specimens with crystallite sizes comparable to the beam size. Building on these results, a systematic study was performed for the first time on beam divergence effects in time-of-flight neutron diffraction data. Two neutron powder diffractometers were employed at the Los Alamos Neutron Science Center: NPD and SMARTS. A single crystal Si specimen was first scanned by varying the incident angle. The diffraction data collected in individual detector tubes showed significant peak shifts attributed to the high divergence of the neutron beam.

Reference

[1] I.C. Noyan et al., *Rev. Sci. Instrum.* **71** (5), 1991-2000 (2000).

INFORMATION PAGE

Speaker:

Ersan Üstündag

Department of Materials Science
California Institute of Technology, Pasadena, CA 91125

Phone: (626)395-2329

Fax: (626) 395-3933

E-mail: ersan@caltech.edu

Contact Person:

Ersan Üstündag

Department of Materials Science, M/C 138-78
California Institute of Technology, Pasadena, CA 91125

Phone: (626) 395-2329

Fax: (626) 395-3933

E-mail: ersan@caltech.edu

The authors grant permission to post this abstract on the DXC web site.

This abstract is intended for an ORAL presentation.

Preferred session: Neutron Diffraction.

The authors intend to publish this paper in *Advances in X-ray Analysis*, Volume 46.