AN IMAGING SOFT X-RAY MICROSCOPE AT THE DARESBURY SYNCHROTRON RADIATION SOURCE

M. Browne, R. Burge, P. Charalambous, P. Duke, A. Freake, A. Mcdowell, A. Michette, G. Nave, R. Rosser, M. Simpson, et al.

▶ **To cite this version:**

M. Browne, R. Burge, P. Charalambous, P. Duke, A. Freake, et al.. AN IMAGING SOFT X-RAY MICROSCOPE AT THE DARESBURY SYNCHROTRON RADIATION SOURCE. Journal de Physique Colloques, 1984, 45 (C2), pp.C2-87-C2-88. 10.1051/jphyscol:1984221 . jpa-00223885

HAL Id: jpa-00223885
https://hal.science/jpa-00223885

Submitted on 4 Feb 2008

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

JOURNAL DE PHYSIQUE
Colloque C2, supplément au n°2, Tome 45, février 1984

AN IMAGING SOFT X-RAY MICROSCOPE AT THE DARESBURY SYNCHROTRON RADIATION SOURCE

M.T. Browne, R.E. Burge, P. Charalambous, P.J. Duke*, A. Freake, A. McDowell*, A. Michette, G. Nave**, R. Rosser**, M.J. Simpson and W. Smith*

Queen Elizabeth College, Campden Hill Road, London, U.K.
**Daresbury Laboratory, Warrington, U.K.*
***Imperial College of Science and Technology, London, U.K.*

Résumé - Un microscope par rayons-X mous qui utilise des lentilles à zone de Fresnel est en cours de mise au point sur la source de radiation synchrotron à Daresbury. L'instrument a été aligné et des résultats préliminaires ont été obtenus.

Abstract - An imaging soft X-ray microscope using Fresnel zone plates is being set up at the Daresbury Laboratory synchrotron radiation source. The instrument has been aligned and preliminary results have been obtained.

An imaging X-ray microscope operating in the 20-50 Å region using Fresnel zone plates as the focussing elements is being set up on the synchrotron radiation source (SRS) at the Daresbury Laboratory. The instrument is described in figures 1-3. The radiation from the SRS is conditioned by a combined diffraction grating and mirror monochromator and is focussed by a horizontal cylindrical focussing mirror operating in the grazing incidence region.

A condensing zone plate about 800 μm diameter is used to focus the radiation onto the object which is then viewed by a micro zone plate. This combination of condenser, object and micro zone plate is assembled "off-line" in the unit shown in figure 2 and aligned using an optical microscope. The condenser unit is then assembled in the X-ray microscope (see figure 1) and the microscope pumped down to a pressure of 10^{-6} torr. The region of the microscope containing the object, micro zone plate and camera unit (figure 3) is operated at a pressure of 10^{-4}-10^{-5} torr.

A 150 μ diameter, 36 mm focal length micro zone plate fabricated by laser interference [1] has been used in an initial test and it is planned to use much higher resolution (50 nm) zone plates with a 250 μm focal length fabricated by STEM lithography [2] during further tests and commissioning which will take place during 1984. In the initial test the microscope has been aligned and synchrotron light recorded on the film. The commercially bought condenser zone plate was however damaged. This, and the very limited time available on the synchrotron has meant that no convincing images have been produced yet.

Acknowledgements

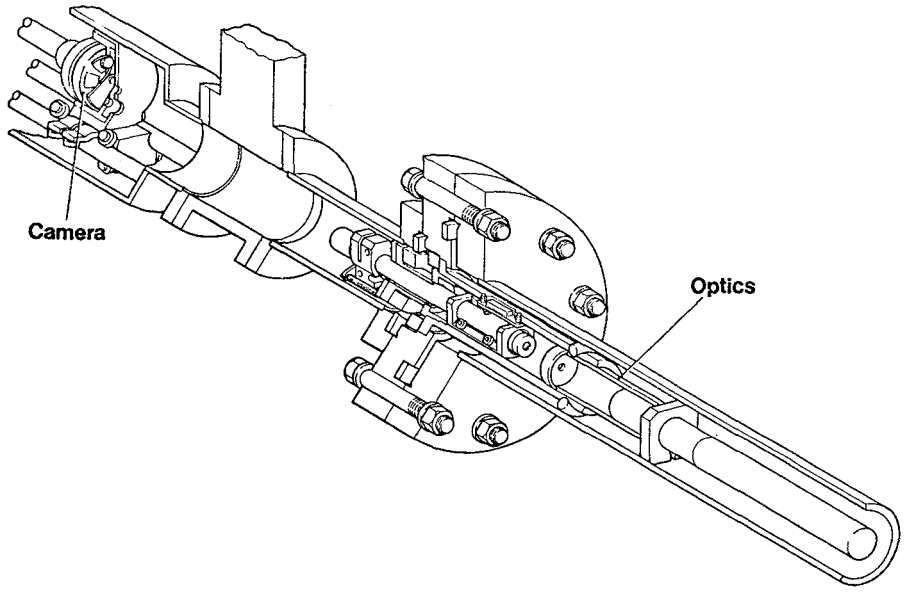
The X-ray microscope units were manufactured by Bird and Tole Ltd, Bledlow Ridge, U.K. and in our own workshops. Drs D. Norman and J.B. West advised on the use of the SR beam line and assisted in the alignment procedures. Financial support from the Science and Engineering Research Council is gratefully acknowledged. MJS and GN are supported by SERC research grants.

References

[1] ROSSER R. Private Communication.
[2] BROWNE M.T., CHARALAMBOUS A., BURGE R.E., DUKE P.J., MICHETTE A.G., and SIMPSON M.J., these proceedings.

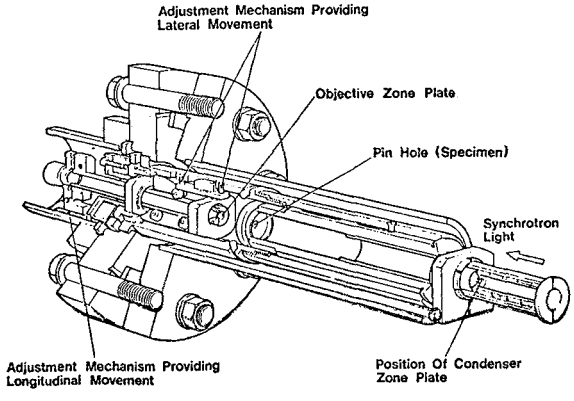
Article published online by EDP Sciences and available at http://dx.doi.org/10.1051/jphyscol:1984221

Figures



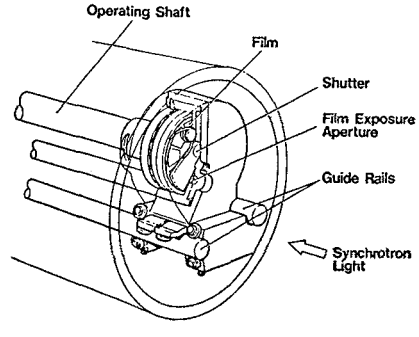
X-RAY MICROSCOPE

Figure 1.



X-RAY MICROSCOPE OPTICS

Figure 2.



X-RAY MICROSCOPE CAMERA

Figure 3.