

## MICROFOCUS LIQUID-METAL-JET X-RAY TUBES AND APPLICATIONS

O. Hemberg<sup>1</sup>, M. Otendal<sup>1</sup>, T. Tuohimaa<sup>2</sup>, H. M. Hertz<sup>2</sup>

<sup>1</sup> Excillum AB, Rådjursvägen 16, SE – 182 76 Stocksund, Sweden

<sup>2</sup> Biomedical and X-Ray Physics, Royal Institute of Technology, SE – 10691  
Stockholm, Sweden

We have previously demonstrated a liquid-metal-jet anode x-ray source concept with potential for a 100-1000× increase in brightness [1]. In the present paper we report on recent progress and demonstrate long-term operation of a high-brightness microfocus source based on this concept. The tube uses a Ga/In/Sn alloy with strong line emission at 9.25 keV (comparable to conventional copper anode sources) as well as significant continuum radiation up 100 keV, depending on settings. The spot size is 5-20 μm with an electron-beam power up to 200 W and a power density of ~10 W/μm. This is >10× more than current state-of-the-art microfocus tubes. This second generation prototype incorporates a continuous recycling system for uninterrupted operation as well as reduced footprint and enhanced reliability. This source shows promise to enable many laboratory-scale x-ray applications, today limited by source brightness. Also, for novel imaging modalities, like phase-contrast imaging [2], source brightness is crucial. Furthermore the system will enable faster and/or more accurate XRF and XRD analysis due to the increased source brightness. The system is now mature enough for scientific and industrial applications and long-term performance data will be presented.

- [1] O. Hemberg, M. Otendal, and H. M. Hertz, “Liquid-metal-jet anode electron-impact x-ray source”, *Appl. Phys. Lett.* 83, 1483 (2003)
- [2] T. Tuohimaa, M. Otendal, and H. M. Hertz, “Phase-contrast x-ray imaging with a liquid-metal-jet-anode microfocus source”, *Appl. Phys. Lett.* 91, 074104 (2007)

## INFORMATION PAGE

Conference: Abstract submitted to DXC

Permission: Permission granted to post abstract on DXC website

Speaker: Oscar Hemberg  
Excillum AB  
Rådjursvägen 16  
SE - 182 76 Stocksund  
Sweden

Phone +46-(0)704-212083  
Fax: +46-(0)8-55378466  
Email: oscar.hemberg@excillum.com

Preference: Oral presentation  
New Developments in XRD and XRF Instrumentation

Publish: Yes, in the DCX proceedings