Efficient Neutron Sources



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Development and Applications of Supermirror

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The introduction of the concept of supermirror in 1967 [1] and its technological realization [2] laid the foundation for increasing the efficiency of the transport of neutrons and of polarization analysis techniques due to the large increase of the maximal angle reflection by a factor of m when compared with the angle of total reflection of Ni. A complete guide system based on supermirror technology was implemented for the first time at the Swiss Spallation Source SINQ at PSI in 1994 using mostly mirrors with m = 2 [4]. The following years witnessed enormous increases in the performance of beamlines for neutron scattering thanks to the combination of new guide concepts, e.g. ballistic guides [5] and non-linearly tapered parabolic and elliptic guides [6], with supermirror whose performance has been improved continuously [7]. Supermirror with high reflectivity on metallic substrates [8] promote new applications namely extending neutron guides close to the moderators and focusing of neutron beams. As a result of the continuous developments of the deposition techniques for supermirrors are available with large angles of reflection, excellent reflectivity, and high polarization if magnetic materials are used. Here we report on the state-of-the-art and on the limitations of the performance of supermirror and possible applications.

[1] V. F. Turchin, Atomic Energy 22, 124 (1967).

[2] F. Mezei, Commun. Phys. 1, 81 (1976); F. Mezei and P. A. Dagliesh, Commun. Phys. 2, 41 (1977).

[3] J. B. Hayter and H. A. Mook, J. Appl. Cryst. 22, 35 (1989).

[4] W. Wagner, G. S. Bauer, J. Duppich, S. Janssen, E. Lehmann, M. Lüthy, and H. Spitzer, J. Neutron Res. 6, 249 (1998).

[5] F. Mezei and M. Russina, Physica B 283, 318 (2000).

[6] C. Schanzer, P. Böni, U. Filges, and T. Hils, Nucl. Instr. and Meth. A 529, 63 (2004); P. Böni, Nucl. Instr. and Meth. A 586, 1 (2008).

[7] M. Hino, H. Sunohara, Y. Yoshimura, R. Maruyama, S. Tasaki, H. Yoshino, and Y. Kawabata, Nucl. Instr. and Meth. A 529, 54 (2004).

[8] C. Schanzer, P. Böni, and M. Schneider, J. Phys.: Conf. Series 251 012082 (2010).

Poster back-up

No

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