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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 supermirror and the improved super-polishing of substrates on an industrial scale, non-magnetic and polarizing 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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