Spin-wave theory of spin-polarized electron energy loss spectroscopy (SPEELS) measurements in 5 ML Fe film deposited on W(110)

S. Mamica and H. Puszkarski

Surface Physics Division, Institute of Physics, A. Mickiewicz University
Umultowska 85, Poznań 61-614, Poland

Detection of spin waves with higher wave-vector values is now possible with spin-polarized electron energy loss spectroscopy (SPEELS), a method recently reported [1, 2] to have been applied for detecting spin waves in a range of wave vector values covering in principle the *whole* Brillouin zone. This paper presents a comparison of spin-wave spectra resulting from our theoretical investigation with the corresponding SPEELS results obtained recently for 5 ML Fe film deposited on W(110) [3]. The model used here is based on a bi-linear Hamiltonian expressed in second-quantization formalism and covering interactions only between nearest neighbours. By considering the *mixed bcc-fcc* film structure (with (110) surface orientation) [4] we were able to explain the reported details of the observed SPEELS spectrum behavior indicating their surface mode origin.

---

[1] S.N. Samarin, J. Berakdar, O. Artamonov, J. Kirschner, Phys. Rev. Lett. **85** (2000) 1746
[2] R. Vollmer, M. Etzkorn, P.S. Anil Kumar, H. Ibach, J. Kirschner, Phys. Rev. Lett. **91** (2003) 147201
[3] R. Vollmer, M. Etzkorn, P.S. Anil Kumar, H. Ibach, J. Kirschner,
J. Magn. Magn. Mater. **272–276** (2004) 2126
[4] A. Biedermann, R. Tscheließnig, M. Schmid, P. Varga, Phys. Rev. Lett. **87** (2001) 086103

Name of the presenting author (poster session II): Sławomir Mamica
e-mail address: mamica@amu.edu.pl
http://www.amu.edu.pl