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## Dispersion-Induced Pseudo-Extinction of the Bragg Reflection and the Magnetic Asymmetry in REXS from Ferromagnets

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The signal of the x-ray magnetic scattering is usually much weaker than that of the electric one. One of the well-known methods of making up for this disadvantage is to tune the x-ray energy to an absorption edge of the magnetic element. Since the theoretical prediction and the pioneering experiments in 1980's [1-3], an enhancement of the magnetic signal at, for example, the rare-earth L<sub>2,3</sub> edges, has been observed for many systems.

Another method of improving the detectability for the magnetic signal is to utilize the polarization dependence of the x-ray scattering. When the incident x rays are linearly polarized within the scattering plane, for example, the electric Thomson scattering is largely suppressed at the scattering angle of around 90 degrees. With such a scattering geometry, therefore, the magnetic scattering having different polarization properties can be relatively magnified [4,5].

In the resonant diffraction from ferromagnetic compounds, there can be an additional method of clarifying the originally weak magnetic signal. That is to aim at the reflection indexes where the electric diffraction signal almost disappears in the vicinity of an absorption edge by the destructive interference among the scattered waves from plural types of constituent elements and the modification of the scattering power of the resonating element due to the so-called dispersion effects. The 444 reflection of the ferromagnetic intermetallic compound GdAl<sub>2</sub> meets such a fortuitous pseudo-extinction condition at the Gd L<sub>3</sub> edge [6]. In the presentation, the experimental results for this reflection at the L<sub>3</sub> edge together with those at the L<sub>2</sub> one will be shown, and the large magnetic asymmetry will be discussed [7].

### REFERENCES

1. M. Blume, J. Appl. Phys. 57, 3615-3618 (1985).
2. Doon Gibbs, D. R. Harshman, E. D. Isaacs, D. B. McWhan, D. Mills, and C. Vettier, Phys. Rev. Lett. 61, 1241-1244 (1988).
3. J. P. Hannon, G. T. Trammell, M. Blume, and Doon Gibbs, Phys. Rev. Lett. 61, 1245-1248 (1988); Phys. Rev. Lett. 62, 2644(E) (1989).
4. D. Laundry, S. P. Collins, and A. J. Rollason, J. Phys.: Condens. Matter 3, 369-372 (1991).
5. D. Hupfeld, O. Seeck, J. Voigt, J. Bos, K. Fischer, and Th. Brückel, Europhys. Lett. 59, 284-290 (2002).
6. H. Adachi, H. Kawata, and M. Ito, J. Appl. Cryst. 48, 1114-1121 (2015).
7. H. Adachi, E. Arakawa, and K. Mori, unpublished.

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