dipolar electric transitions: $\Gamma_4 \rightarrow \Gamma_5$ (σ polarization) and $\Gamma_4 \rightarrow \Gamma_1$ (π polarization). So the results on $ThSiO_4:U^{4+}$ appear as essential to improve the calculations of the usual spectroscopic parameters (the Slater's parameters F^k, the spin–orbit constant ξ and the crystal field parameters B_q^k) for the two other crystals $ThCl_4:U^{4+}$ and UCl^4. These calculations are underway.

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B28

Neutron Diffraction Study of $U_{0.5}Np_{0.5}O_2$

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A neutron powder diffraction study of $U_{0.5}Np_{0.5}O_2$ has been performed recently at the D2 spectrometer of the ILL high flux reactor. Neutron diffraction patterns were recorded for the temperature range $3 \leqslant T \leqslant 293$ K. This compound crystallizes in the CaF_2-type structure. The lattice parameter has been found to be $a = 5.4624(3)$ Å in the temperature range $3 \leqslant T \leqslant 37$ K. A magnetic ordering was observed below $T_N \cong 12$ K, in agreement with the previous Mössbauer experiments [1]. Surprisingly the observed magnetic order is different from the one previously found in UO_2 [2]. Actually only one weak magnetic reflection quite near to the ½, ½, ½ line referred to the nuclear unit cell was observed; the high Miller indice reflections are probably too small due to the magnetic form factor to be seen. The magnetic order is compatible with the ordered moment – 0.6 μ_B per Np atom – observed by Mössbauer resonance. A striking fact is the large width of the magnetic reflection which decreases only slightly with T remaining higher by a factor of about 5 as compared to the width of the 1,1,1 nuclear reflection; this fact is probably to be attributed to a short range of the magnetic order (a correlation length of about 20 Å has been found). Moreover clustering effects of Np and U ions should be excluded.

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