

## Single crystal growth and magnetic properties of a new ternary uranium compound $U_3Ni_5Al_{19}$

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A new ternary uranium-based intermetallic compound  $U_3Ni_5Al_{19}$  has been found. It crystallizes into a unique flat orthorhombic cell (Cmcm, No. 63) with lattice parameters  $a = 4.083$ ,  $b = 15.874$  and  $c = 26.886$ . Uranium atoms occupy two crystallographic sites  $4c$  and  $8f$  where local chemical environments are quite similar, as shown in Fig. 1(a). Magnetic susceptibility  $\chi(T)$  demonstrates peculiar magnetic anisotropy as shown in Fig. 1(b). The small susceptibility value along the  $a$ -axis indicates that the magnetic moments lie within the  $a$ -plane.  $\chi(T)$  obeys a Curie-Weiss law above 23 K for both  $b$  and  $c$  directions. At 23 K, only  $\chi(T)$  for the  $c$  direction shows a sharp cusp, while  $\chi(T)$  along  $b$  remains paramagnetic behavior down to 2 K. This result and crystallographical considerations together with preliminary neutron scattering experiments lead to a conclusion that only uranium atoms at  $8c$  sites order antiferromagnetically at  $T_N = 23$  K. On the other hand, uranium at  $4c$  sites remain paramagnetic down to 0.5 K

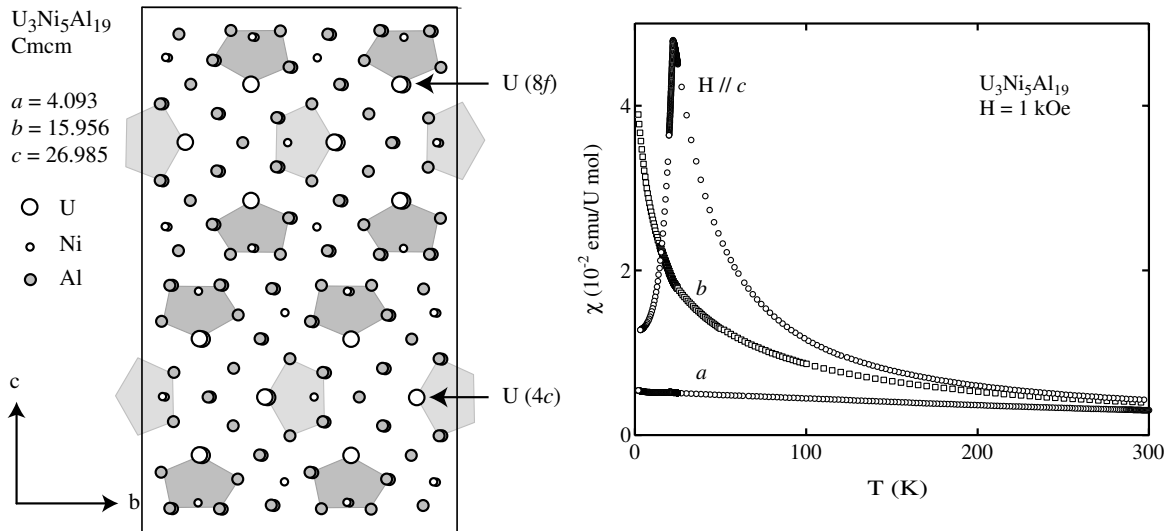


Figure 1: (a) Crystal structure of  $U_3Ni_5Al_{19}$ . (b) Magnetic susceptibility of  $U_3Ni_5Al_{19}$ .