Magnetic properties of a novel $CeCo_{0.715}Si_{2.285}$ compound

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We report on the basic physical properties of a novel $CeCo_{0.715}Si_{2.285}$ compound, mainly its rich magnetic phase diagram. Using the Czochralski method (single) crystals have been grown for the first time. The compound crystallizes in the *I-42m* space group structure with extremely prolongated unit cell ($a = 4.12$ Å, $c = 32.84$ Å). In a zero magnetic field it orders antiferromagnetically at $T_N = 10.5$ K with another order-to-order transition at 9.5 K. Under application of a magnetic field along the *c*-axis it manifests numerous magnetic phases in small fields ($B < 500$ mT), similar to the so-called "devil's staircase" systems, however, having the high field state stable with respect to field removal. Above 1 T the magnetization is almost unchanged up to 14 T (maximum magnetic field applied within our study) and quite reduced (0.3 μ_B/Ce) with respect to the free Ce^{3+} ion. The compound also exhibits strong hysteresis of magnetization in temperature and magnetic field. For fields applied along the *a*-axis a typical behavior for the antiferromagnetic hard axis is observed.