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SHORT COMMUNICATION

Superconductivity of $LaOs_2$

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Recently, $LaOs_2$ has been found to exist in both the cubic $MgCu_2$-type and hexagonal $MgZn_2$-type structures, the latter induced by the application of high temperature and pressure[1]. Since the cubic form becomes superconducting at a relatively high temperature (~9K)[2], it was of interest to determine the transition temperature of the newly discovered hexagonal form.

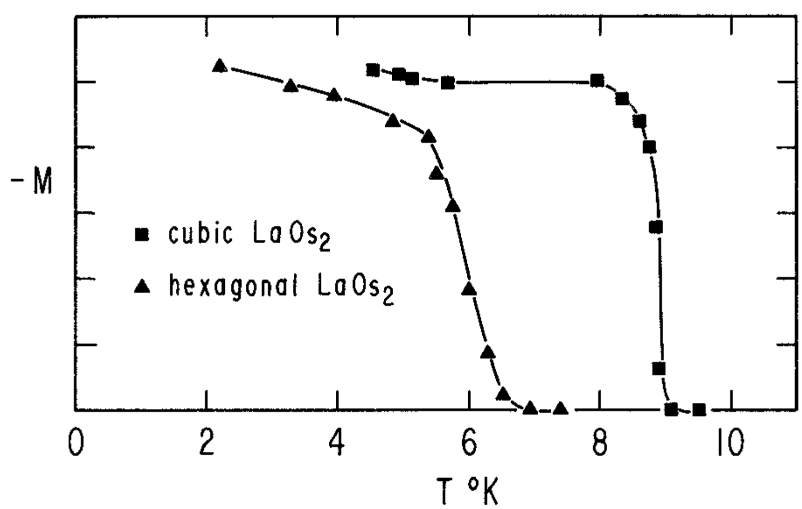

Fig. 1. Superconducting transitions of cubic and hexagonal $LaOs_2$.

The temperature dependence of sample magnetization was measured in an applied field of 30 Oe. Figure 1 shows the transitions which occur at 8.9K for cubic $LaOs_2$ but only 5.9K for hexagonal $LaOs_2$. The presence of free lanthanum (T_c ~5K) is also evident in both transitions.

An X-ray powder diffraction pattern obtained at 6K showed that cubic $LaOs_2$ retains its cubic structure down to this temperature. (A deformation as small as 10^{-3} could have been detected in this experiment.) The instability of cubic $LaOs_2$ is thus restricted to high temperatures and pressures.

In view of the superconductivity of $CeRu_2$[3], it is also of interest to consider the absence of superconductivity in both $MgCu_2$-type[4] and $MgZn_2$-type[5] $CeOs_2$. In cubic $CeOs_2$, superconductivity is inhibited by the fractional cerium *f*-electron which lattice parameter measurements have shown must exist in this compound[6]. Since the hexagonal form is prepared under pressure, one might expect that this *f*-

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electron would be squeezed away and that superconductivity could result. However, comparison of the unit cell volumes of cubic and hexagonal $LaOs_2$, $CeOs_2$ and $PrOs_2$ (Table I) shows that for $CeOs_2$ no significant compression occurs at all as the result of the cubic-hexagonal conversion. Superconductivity of the hexagonal $CeOs_2$ is therefore not expected.

TABLE I

	V_{cubic} (Å^3)	V_{hex} (Å^3)	$DV/V_{cubic} \times 10^3$
$LaOs_2$	464.0(0.4)	462.0(0.2)	-4.7(1.0)*
$CeOs_2$	437.8(0.2)	437.9(0.2)	+0.2(0.6)
$PrOs_2$	449.5(0.2)	448.4(0.2)	-2.4(0.6)

* The number in parentheses represents the most probable error.

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