dialogue

HIGH-TEMPERATURE SUPERCONDUCTIVITY

In the first issue of LASL Science, we reported an enormous lattice softening in Ir-Y alloys, which reached a minimum near the eutectic composition. This softening had implications for superconductivity which were thoroughly discussed in our article.

We have now turned our attention toward the metastable alpha prime phase of plutonium, in which up to 1.7 at.% aluminum (normally insoluble in the alpha lattice) has been entrapped by a pressure induced martensitic phase transformation, This entrapment of aluminum into the alpha-plutonium lattice causes profound alterations in the thermal, elastic and mechanical properties of the material. Two of these results—an increased compressibility (measured by sound speed and by mechanical compression tests) and a concomitant anomalous expansion of the lattice-had led previous investigators to believe that the lattice was probably softened through an electronic change in the plutonium 5f electron bonding characteristics.

We felt we could quantitatively investigate (and perhaps further understand) this softening using again the technique of small sample calorimetry discussed in the superconductivity article, (LASL Science 1980), Therefore a 15 mg foil of Pu-1.7 at.% Al was prepared and measured at low temperatures to determine the Debye temperature, a measure of the lattice stiffness. Our results show that the entrapment of 1.7 at.% aluminum into the plutonium alpha lattice reduces the Debye temperature of that lattice by an amazing 30%.

Thus, we have been able to verify in a quantitative manner the degree of softening of the plutonium alpha-phase lattice into which foreign aluminum atoms have been trapped. The question remains however: Why does aluminum weaken the bonds in the alpha-plutonium lattice? We plan to continue our work to dig deeper into this problem.

G. R. Stewart, R. O. Elliott,
and B. T. Matthias

ON THE FIRST ISSUE

As an editor of a number of international scientific journals and someone who has been associated with scientific publishing for a long time, I write to congratulate you on Volume 1, No. 1 of your new publication. It is clearly a much superior publication to any of those put out as yet by the other national laboratories, and will clearly hold its own with any publication in the world market.

This is a major accomplishment for the first issue of any journal, and I can only congratulate you and wish you every success in maintaining this excellent standard in the issues that lie ahead.

Your mix of articles and the obvious careful editorial work that shows in them is both a tribute to the scientific work at Los Alamos and to the care that went into the production of this first issue.

Having said this about the magazine as a whole, let me in particular congratulate Mitchell J. Feigenbaum on his article entitled, "Universal Behavior in Non-Linear Systems." This is by a large measure the clearest exposition of the most recent work leading toward an understanding of turbulence that I have yet found, and I much appreciated it.

D. Allan Bromley, Director
A.W. Wright
Nuclear Structure Laboratory
Yale University

I found the first issue of "Los Alamos Science" both interesting and useful and look forward to future issues. At first I was slightly disturbed by what seemed to be a conflict between "pop feature" layout and almost academic text—as if the illustrations were both out of style and scale. But, hats off to you, the content is good. I like it.

Anthony Tucker
Science Correspondent
The Guardian,
Manchester, England

I wish to congratulate you on the publication of the first issue of "Los Alamos Science."

I enjoyed reading this copy of your excellent magazine and look forward to receiving future issues.

David A. Shirley, Director LBL

Got your first issue of Los Alamos Science. It is great! Congratulations!!

Harold M. Agnew
President, General Atomic Company

Your comments on articles appearing in Los Alamos Science are welcome. Please address c/o **The *Editor, Los Alamos Science, Mail Stop 399, P. O. Box 1663, Los Alamos, NM 87545.***