Comment on Anomalies in $K_{1-x}Rb_xC_8$

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Since Professor Hartmut Zabel explained the characteristic features of anomaleis and our mechanism to explain them very clearly in a previous talk, I do not think to repeat them.

The most important point in the mechanism by Akera and Kamimura [1,2,3] is that the elastic anomaly is due to an electronic origin. That is, when the interlayer spacing increases by mixing Rb into C_8K, the upper interlayer band with 3D character comes down towards the Fermi level, and then when a saddle point type van Hove singularity in the density of states of the upper interlayer band touches just at the Fermi level at a certain value of x near 2/3, the softning in the layer compressional eleastic constant C_{33} occurs.

In C_8Rb both the upper and lower interlayer bands lie below the Fermi level. Thus this softning always must occur at a certain value of x, irrespective of whether the dependence of the interlayer spacing on x obeys to Vegard's law or not. Only discrepancy between theory and experiment was with regard to the magnitude of the anomaly. The calculated value of anomaly was very small; it was only one third of the observed value previously reported.

However, I am very pleased to hear in Prof. Zabel's talk today that experimental results of C_{33} recently performed on various kinds of samples show less deep anomalies, consistent with our prediction based on the band structure effect.

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1. H. Akera and H. Kamimura, Synthetic Metals 12 (1985) 275
2. H. Akera and H. Kamimura, J. Phys. Soc. Jpn. 55 (1986) 2326
3. H. Kamimura and H. Akera, Proc. Sino-Japan Bilateral Workshop on Statistical Physics and Condensed Matter Theory, ed. Xie Xide (World Scientific, Singapore, 1986) p.16.