^{13}C-NMR study of the Dirac-electron systems in the quasi-two-dimensional organic conductor θ-(BEDT-TTF)$_2$I$_3$ under hydrostatic pressures

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The recent discovery of low energy excitations in graphene with linear energy-momentum relations, known as the Dirac electrons, has stimulated great interests both theoretically and experimentally [refs. 1, 2]. These kinds of novel quasi-particles have also been suggested to be in the organic conductors θ and α-(BEDT-TTF)$_2$I$_3$ (θ- and α-I$_3$) under high pressures (above 0.6 and 2.0 GPa, respectively) [refs. 3-5], which have, however, different characteristics from those of graphene because of the strong electronic correlations and the lower lattice symmetry [ref. 3]. θ- and α-I$_3$ may be novel platforms that afford us a great possibility to understand the electronic properties of Dirac electrons in a distinct and/or profound way owing to the bulky nature of the organic crystals.

Here, we report the electronic properties of θ-I$_3$ under ambient and hydrostatic pressures (> 0.6GPa) revealed with the aid of ^{13}C-NMR. The metallic state at ambient pressure was identified as a usual Fermi liquid state which satisfied Korringa's relation with the NMR enhancement factor K_α of about 2 from 100K down to 5 K. These results suggest that the electronic correlation is weak (Fig. 1). On the day, results under hydrostatic pressures will also be shown and compared with the theoretical predictions [ref. 6].

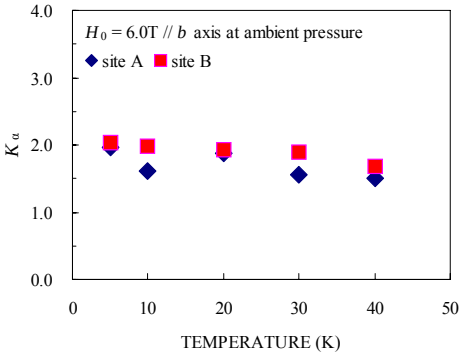

Fig. 1 ^{13}C-NMR of θ-(BEDT-TTF)$_2$I$_3$

[1] K. S. Novoselov *et al.*, *nature* **438** (2005) 04233.
[2] Y. Zhang *et al.*, *nature* **438** (2005) 04235.
[3] N. Tajima *et al.*, *J. Phys. Soc. Japan* **75** (2006) 051010.
[4] N. Tajima *et al.*, *Phys. Rev. Lett.* **102** (2009) 176403.
[5] S. Katayama *et al.*, *J. Phys. Soc. Japan* **75** (2006) 054705.
[6] A. Kobayashi *et al.*, *J. Phys. Soc. Japan* **77** (2008) 064718.