

Abstract Submitted  
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**Specific heat of rhombohedral C60 polymer in the temperature range of 2-300K**<sup>1</sup> MIN GU, GUANGLEI CUI, LIHANG WANG, XIAO CHEN, National Laboratory of Solid State Microstructures, Nanjing University — Under high temperature of 700 K and high pressure of 6 GPa, we have prepared a batch of C60 polymer. XRD data confirmed it is rhombohedral phase and solid <sup>13</sup>C NMR showed a formation of sp<sup>3</sup> bond between two neighbor C60 in (111) plane. We have measured the specific heat of C60 polymer and pristine C60 by PPMS in the range from 2 to 300 K. The experimental result of pristine C60 agreed well with previous report. For C60 polymer, above T=80 K it is found that temperature dependence of the specific heat is similar to that of pristine C60 besides an anomaly from order-disorder phase transition at 260K, but in range from 2 to 80K the specific heat is much less than that of pristine C60. Assuming three- (3D) and two-dimensional (2D) Debye phonon modes to contribute respectively to the specific heat in different temperature zone, the calculated values of specific heat have got a good agreement with the experimental data in the whole temperature range. These results show the 2D planar modes but not 3D modes are a dominator to the specific heat of C60 polymer, and the low-frequency intermolecular modes of C60 lattice are restrained in the case of C60 polymer by sp<sup>3</sup> bonds from 2+2 cycloaddition reaction.

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