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Thermodynamics and existing phase of Ba-phenanthrene SATOSHI HEGURI, QUYNH THI NHU PHAN, WPI-AIMR, Tohoku University, YOICHI TANABE, Department of Physics, Tohoku University, KATSUMI TANIGAKI, WPI-AIMR, Tohoku University — The recent discovery of superconductivity in potassium doped picene suggested the possibility of a new class of superconductors. The problem is that no satisfactory guide to improve the superconducting shielding fraction had been provided until recently. However, a high superconducting shielding fraction of 65 % was reported for $Ba_{1.5}$(phenanthrene). Considering this situation, phenanthrene (PHN) appears to be a key material for confirming the existence of metallicity and superconductivity in the aromatic hydrocarbon (AHC) family, and also for clarifying the physical properties and superconducting mechanism of AHC superconductors. In the present work, the thermodynamics for intercalation of PHN with Ba is studied in comparison with its isomer of anthracene (AN). Contrarily to previous reports by other authors, the important observation that Ba is intercalated into neither PHN nor AN without affecting their molecular structures is unambiguously made by differential scanning calorimetry measurements and annealing time dependences observed by powder x-ray diffraction measurements. The reactions of Ba and PHN at elevated temperatures lead this system to molecular decomposition instead of intercalation. The phenomena of metallicity and superconductivity in PHN intercalated with alkaline earth metals (Ba or Sr) should be reconsidered.

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