

## HIGH-RESOLUTION AND HIGH-PRECISION LASER SPECTROSCOPY OF A-BENZANTHRACENE

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The electronic excited states of polycyclic aromatic hydrocarbons (PAHs) are especially interesting and high-resolution laser spectroscopy is very powerful to elucidate molecular structure and excited-state dynamics. We observed and analyzed the high-resolution and high-precision spectrum of the  $S_1 \leftarrow S_0$  0-0 band of jet-cooled a-benzanthracene using a single-mode laser system precisely controlled by optical frequency comb <sup>a</sup>. There are two candidates for the  $S_1$  state of planar PAHs with high symmetry such as naphthalene and anthracene,  $\Psi_A$  (HOMO  $\rightarrow$  LUMO : strong transition and short fluorescence lifetime) and  $\Psi_B$  (HOMO  $\rightarrow$  LUMO+1 and HOMO-1  $\rightarrow$  LUMO : weak transition and long fluorescence lifetime) <sup>b</sup>. The  $S_1$  states of naphthalene and zigzag catacondensed PAHs are well expressed by  $\Psi_B$ , but The  $S_1$  states of anthracene and linear catacondensed PAHs show typical properties of  $\Psi_A$ , strong fluorescence and short-lived. It is concluded that the  $S_1$  state of a-benzanthracene is the mixture of  $\Psi_A$  and  $\Psi_B$  and shows an intermediate property because of its low symmetry.

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<sup>a</sup>A. Nishiyama, K. Nakashima, A. Matsuba, and M. Misono, *J. Mol. Spectrosc* **318**, 40 (2010).

<sup>b</sup>M. Baba, T. Katori, M. Kawabata, S. Kunishige, and T. Yamanaka, *J. Phys. Chem. A* **117**, 13524 (2013).