



Title	Photoinduced Phase Transitions in Polyacene and Its Heterocyclic Analogs [an abstract of dissertation and a summary of dissertation review]
Author(s)	張, 龍龍
Citation	北海道大学. 博士(理学) 甲第11372号
Issue Date	2014-03-25
Doc URL	http://hdl.handle.net/2115/55582
Rights(URL)	http://creativecommons.org/licenses/by-nc-sa/2.1/jp/
Type	theses (doctoral - abstract and summary of review)
Additional Information	There are other files related to this item in HUSCAP. Check the above URL.
File Information	Zhang_Longlong_abstract.PDF (論文内容の要旨)



[Instructions for use](#)

学 位 論 文 内 容 の 要 旨

Abstract of Doctoral Dissertation

博士の専攻分野の名称 博士(理学) 張 龍龍
Degree requested Doctor of Science Longlong Zhang

学 位 論 文 題 名

Title of Doctoral Dissertation

Photoinduced Phase Transitions in Polyacene and Its Heterocyclic Analogs

(ポリアセン及びその複素環式類似体における光誘起相転移)

Photoinduced structure phase transitions in polyacene, paracyanogen and boron-nitride acene are studied. In each compound, there exist two degenerate lattice distorted structure: double bonds in a *cis* pattern and those in a *trans* pattern. In polyacene and paracyanogen, *cis* patterned lattice configurations hold the mirror symmetry while *trans* ones have the C_{2z} rotation invariance. In boron-nitride acene, either *cis* pattern or *trans* pattern has no definite symmetries. We argue that the symmetry properties will strongly affect the optical properties and lead to contrast optical conductivity between the *cis* pattern and *trans*- patterns.

By using the time-dependent Hartree Fock method, we simulate the lattice relaxation process in polyacene, paracyanogen and boron-nitride acene after they are photo excited. We find that photons will induce the lattice fluctuation to preserve the symmetry of the initial state. Due to this symmetry preserving law, phase transitions in polyacene and paracyanogen behaves as a one way switching: Only *trans* patterns can be well converted into *cis* ones, but the reverse conversion is forbidden. Since boron-nitride acene has no definite symmetries in any types of lattice configuration, the symmetry preserving law does not work and the phase transitions between *cis* pattern *trans* pattern is bidirectional.