

## 室温りん光を示すジ(2-チエニル)ジケトン誘導体の過冷却液体状態における発光ダイナミクス

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Photoluminescence Dynamics of a Thienyl Diketone Derivative Showing Room-Temperature Phosphorescence in the Supercooled Liquid State (<sup>1</sup>Graduate school of Science, Kyushu Univ., <sup>2</sup>Graduate school of Science, Osaka Univ.) ○Shuji Kimura<sup>1</sup>, Masaki Saigo<sup>1</sup>, Tomohiro Ryu<sup>1</sup>, Kiyoshi Miyata<sup>1</sup>, Yosuke Tani<sup>2</sup>, Takuji Ogawa<sup>2</sup>, Ken Onda<sup>1</sup>

Recently, thienyl diketone derivatives that show room-temperature phosphorescence (RTP) have been reported but the mechanism of RTP is elusive. We focused on **TES-BrTn** (Fig. 1a inset), which exhibit RTP in the supercooled liquid state. We investigated the photoluminescence dynamics associated with phase transition between crystal, liquid, and amorphous states using temperature-dependent time-resolved photoluminescence spectroscopy.

The emission lifetimes were strongly dependent on the phases, while the phosphorescence spectra were almost unchanged. The emission lifetime of crystal phase decreased as the temperature increased from 20 °C and drastically shortened around melting point (68 °C) (Fig. 1a). After the crystal-to-liquid transition, we gradually lowered the sample temperature to obtain the supercooled liquid state. In the supercooled liquid state, the emission lifetime gradually increased as the temperature decreased, and drastically increased between 10 °C and 0 °C caused by the phase transition from the supercooled liquid to the amorphous.

**Keywords:-** Room-temperature phosphorescence; Supercooled liquid state; Time-resolved spectroscopy; Emissive material

近年、室温りん光を示すジ(2-チエニル)ジケトン誘導体が開発された。本研究では特に非剛直な環境である過冷却液体状態で室温りん光を発する **TES-BrTn** (Fig. 1a 挿入) に注目し、時間分解発光分光を用いて相転移に伴う発光ダイナミクスを測定した。

結晶、液体、アモルファスでりん光スペクトルに大きな変化は見られなかったが、発光寿命には大きな変化が見られた。**TES-BrTn** の結晶の温度を上昇させると発光寿命は減少し、融点 (68 °C) 付近で極端に短寿命化した (Fig. 1a)。続いて温度を低下させ過冷却液体状態にすると発光寿命は緩やかに長寿命化し、10 °Cから 0 °Cへの間では大きな増加が見られた (Fig. 1b)。発表では、相転移に伴う発光メカニズムを議論する

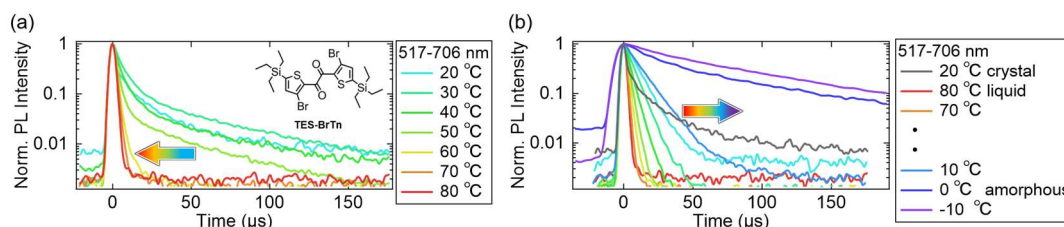


Figure 1. Decay profiles of PL intensities for **TES-BrTn** (a) from 20 °C (crystal) to 80 °C (liquid) and, (b) from 80 °C (liquid) to -10 °C (amorphous).

1) M. Komura, T. Ogawa, and Y. Tani, *Chem. Sci.*, **2021**, 12, 14363.