不純物制御した BN からの近紫外線発光（II）電界放出ランプの試作

Impurity-induced near-UV emission from boron nitride (II) Preparation of field emission lamps (FELs)

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UV light sources are used for many industrial, medical and analytical applications such as adhesive curing, covert communication, biodetection, phototherapy, surface cleaning and water purification. Currently, the UV light is realized by using gas-state luminescent materials (*i.e.*, UV gas lamps), which has disadvantages of low stability, short lifetime, large size, and environment pollutions (in the case of mercury and excimer lamps). To achieve highly reliable, long-lived and robust UV lamps, the use of solid-state phosphors is thus proposed. In addition, field emission lamps (FELs), consisting of a cold cathode and phosphor(s), promise high efficiency, low energy consumption, environment friendly and compactness, enabling them to be very amazing UV light sources.[1]

Non-doped BN phosphors have shown very good cathodoluminescence under electron irradiation, exhibiting several sharp peaks in the UV spectral region. In addition, BN itself is a stable covalent nitride compound, thus making it possible to be used as a robust emissive material in UV FELs. In this work, we attempted to prepare UV FELs by utilizing BN phosphors, and investigated their optical properties. As shown in Fig. 1, the FEL shows a broad emission band, consisting of a dominant peak at 319 nm and two side peaks at 307 and 333 nm. No luminance saturation is observed when the anode current and voltage are smaller than 167 μA and 12.5 kV, respectively. These preliminary results indicate that BN phosphors have great potentials to be used in UV FELs.

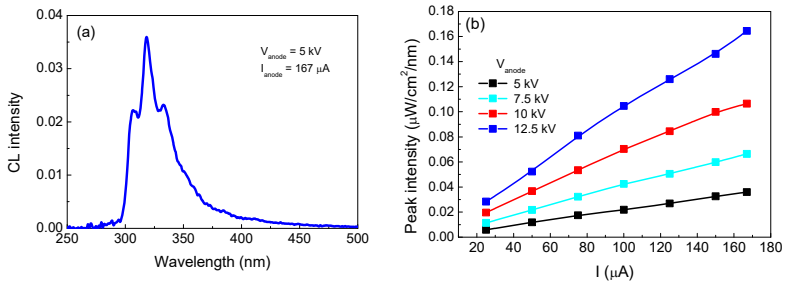

Figure 1 Optical properties of near-UV FELs using BN phosphors (a) cathodoluminescence spectrum driven at 5 kV and 167 μA, and (b) CL intensity at 319 nm as a function of anode current.

References

[1] M. Yanagihara, M.Z. Yusop, M. Tanemura, and *et al.* APL Mater., 2, 046110 (2014).