Emission Behaviors of All-Inorganic and Organic-Inorganic Type Perovskite Single Nanocrystals

Hiroyuki Yoshimura[1], Sadahiro Masuo[2]

[1] Department of Chemistry
[2]Department of Applied Chemistry for Environment
Kwansei Gakuin University, 2-1 Gakuen, Sanda, Hyogo 669-1337, Japan

E-mail: masuo@kwansei.ac.jp

We have demonstrated that multiphoton emission from a single quantum dot (QD) can be controlled using plasmonic nanostructures.[1-3] Perovskite QDs (PQDs) are attractive materials. The emission behavior of single all-inorganic PQDs ($CsPbX_3$) has been reported in several papers.[4] However, there are no reports about that of organic-inorganic PQD ($CH_3NH_3PbX_3$). In this work, we evaluated the emission behavior of all-inorganic ($CsPbI_3$) and organic-inorganic ($CH_3NH_3PbBr_3$) PQDs. The all-inorganic and organic-inorganic PQDs were prepared using solvothermal and reprecipitation methods, respectively, and the emission behaviors of the single PQDs are shown in Fig.1. The photon correlation histograms (c, d) indicate that these are single PQDs. The emission stability of all-inorganic PQD was more superior to that of organic-inorganic PQD (a, b). In the decay curves (e, f), the contribution of a short decay component of organic-inorganic PQD was much higher than that of the all-inorganic PQD, indicating the existence of surface defects. Therefore, single organic-inorganic PQD exhibited lower emission stability.

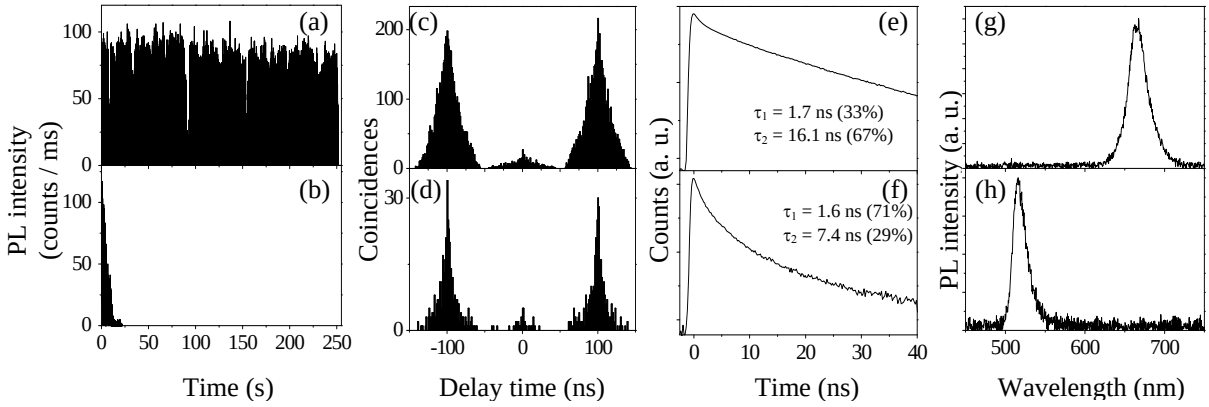

Figure 1. Time traces of emission intensity (a, b), photon correlation histograms (c, d), emission decay curves (e, f), and emission spectra (g, h) detected from single all-inorganic (a, c, e, and g) and organic-inorganic (b, d, f, and h) PQDs.

References:

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