

ペロブスカイトナノ結晶の1次元配列制御

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Control over One-Dimensional Arrangements of Perovskite Nanocrystals

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Perovskite nanocrystals (PNCs) have been actively researched due to their outstanding emission properties in dispersed conditions. On the other hand, the physical properties derived from their aggregate structures have not been revealed because the formation of PNC aggregates is quite difficult. Recently, we have succeeded in the supramolecular structures consisting of semiconductor nanocrystals and self-assembling organic molecules^{1,2}. In this work, we synthesized CsPbBr₃ PNCs and a cholesterol derivative (Chol-COOH) which have an adhesion moiety onto the PNC surface and hydrogen bond sites (Fig. 1a). Thereafter, we attempted the one-dimensional arrangements of PNCs by using self-assembly of Chol-COOH. The transmission electron microscopic observation revealed the formation of unique aggregates with arranged PNCs in toluene/cyclohexane (1:9, v/v) (Fig. 1b). This result indicates that PNCs absorb along the one-dimensional aggregates of Chol-COOH.

Keywords : Perovskite Nanocrystals; Nanofiber; One-Dimensional Arrangements; Cholesterol; Self-Assembly

ペロブスカイトナノ結晶(PNC)は、分散状態で優れた発光特性を示すことから近年盛んに研究されている。一方、PNCを溶液中で自己集合させることは難しく、集合構造由来の物性は殆ど明らかになっていない。当研究室では最近、有機分子の自己集合を用いることで半導体ナノ結晶が配列した超分子集合体の構築に成功した^{1,2}。本研究では、CsPbBr₃ PNC、および PNC への吸着部位と水素結合部位を持つコレステロール誘導体(Chol-COOH, Fig. 1a)を合成し、Chol-COOH の自己集合を用いて PNC の1次元配列を試みた。透過電子顕微鏡 (TEM) により、配列した PNC の集合体が観測され、Chol-COOH の1次元集合体に沿って PNC が吸着し配列していることが示唆された(Fig. 1b)。

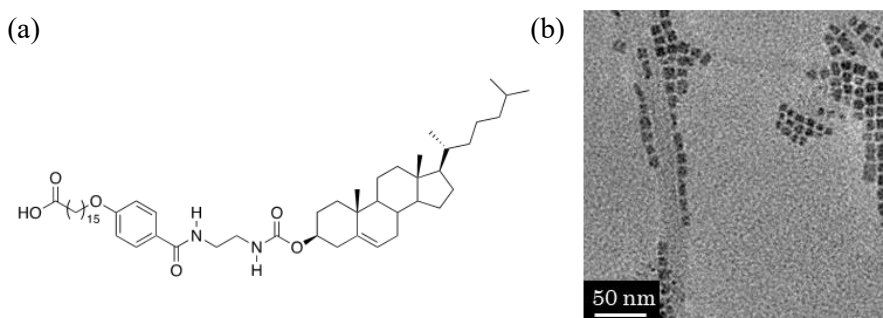


Fig. 1. (a) Chemical structure of Chol-COOH. (b) TEM image of PNCs and Chol-COOH mixture.

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