## Synthesis and photophysical properties of aggregate-formed Eu(III) complex with amide group in solvents

(<sup>1</sup>School of Engineering, Hokkaido University, <sup>2</sup>Faculty of Engineering, Hokkaido University, <sup>3</sup>Institute for Chemical Reaction Design and Discovery, Hokkaido University) ○Yusaku Yamaguchi<sup>1</sup>, Sunao Shoji<sup>2,3</sup>, Wang Menfei<sup>3</sup>, Yuichi Kitagawa<sup>2</sup>, Koji Fushimi<sup>2</sup>, Yasuchika Hasegawa<sup>2,3</sup>

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Lanthanide complexes consisted of organic ligands and lanthanide ions exhibit characteristic 4f-4f emission with narrow emission bands and long emission lifetimes. In previous work, a Eu(III) complex that has hydrophilic polyether chains prepared for was bioimaging. The Eu(III) complex was found to form aggregates in water media and showing intensive



Figure 1. Chemical structure of [Eu(ntfa)<sub>3</sub>(HEAPO)<sub>2</sub>].

luminescence<sup>[1]</sup>. In this study, we report on a novel Eu(III) complex with hydrophilic ether chains containing amide groups for conjugating biological molecules in water media (Figure 1).

The Eu(III) complex, [Eu(ntfa)<sub>3</sub>(HEAPO)<sub>2</sub>], was prepared by complexation of [Eu(ntfa)<sub>3</sub>(H<sub>2</sub>O)<sub>2</sub>] with HEAPO in dichloromethane, and identified by IR, <sup>19</sup>F-NMR, elemental analysis, and mass spectrum. We found that [Eu(ntfa)<sub>3</sub>(HEAPO)<sub>2</sub>] tends to form aggregates at 1 mM in methanol. [Eu(ntfa)<sub>3</sub>(HEAPO)<sub>2</sub>] shows 4f-4f emission bands in the  ${}^{5}D_{0} \rightarrow {}^{7}F_{J}$  (J = 0.4) transitions. The emission lifetimes of [Eu(ntfa)<sub>3</sub>(HEAPO)<sub>2</sub>] were estimated to be 0.30 ms for 1 mM and 0.22 ms for 0.1 mM. Using the emission spectra and emission lifetimes, emission quantum yields were calculated to be 25% for 1 mM and 16% for 0.1 mM. The relatively high emission quantum yield at 1 mM is considered to originate from the aggregates formed in methanol solution.

[1] M. Kono, and Y. Hasegawa et al., Activity sensing of cancer cells using luminescent Eu complexes in culture solution, Annual Meeting on Photochemistry 2021, The Japanese Photochemistry Association, online, Sep. 14-16 (2021).