Modulation of chemilumiescence based on POSS scaffolds

(*Graduate School of Engineering, Kyoto University*) ○Daisuke Iizuka, Masayoshi Gon, Kazuo Tanaka

Keywords: POSS; chemiluminescence; luminol; energy transfer; dendrimer

Chemiluminescence is a well-known phenomenon in which chemical energy is converted into photon energy and applicable for various chemical and biological applications. This is attributed to no external light excitation, offering many prominent advantages over traditional photon emission-based methods. Despite that chemiluminescence has such attractive features, there remains substantial stumbling blocks such as short emission wavelength. To solve this problem, chemiluminescence resonance energy transfer (CRET) is feasible,[1)] but in solution the energy transfer is inefficient. Even when the energy donor and acceptor are connected, the emission intensity decreases since chemical modification of the CL moieties often impairs its chemiluminescence ability.

Polyhedral oligomeric silsesquioxane (POSS) is a rigid cubic molecule composed of Si–O bonds possessing eight organic side-chains on each vertex. Recently, its derivatives attracted attentions because of their ability to effectively encapsulate hydrophobic guest molecules.[2)] In this research, we report chemiluminescence systems based on POSS scaffolds. We introduced the coumarine-modified POSS network as the acceptor molecule (Figure 1) into chemiluminescence systems and the effect of POSS on resulting chemiluminescence properties was examined. We will show the results in detail.

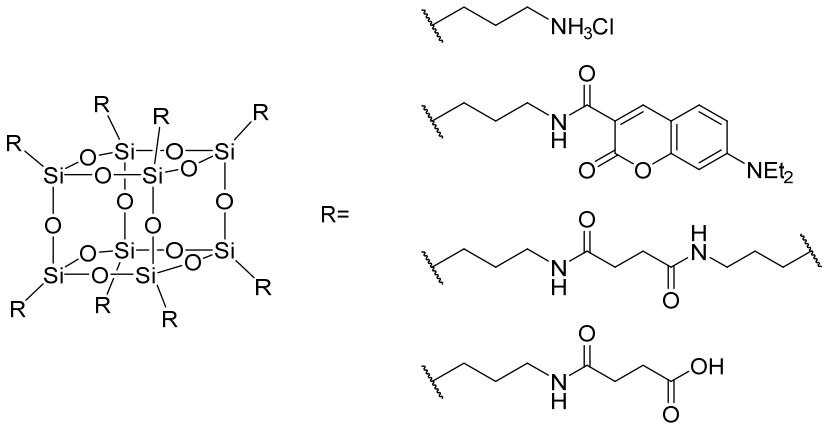

Figure 1. Chemical structure of coumarine-modified POSS network.

1) Han, J.; Jose, J.; Mei, E.; Burgess, K. *Angew. Chem. Int. Ed.* **2007**, *46*, 1684–1687.
2) Nakamura, R.; Narikiyo, H.; Gon, M.; Tanaka, K.; Chujo, Y. *Mater. Chem. Front.* **2019**, *3*, 2690–2695.