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Observing various actin structures using optical measurement without indicator

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The cytoskeleton controls the cell form and determines the mechanical strength of cells. It is made of three types of filaments such as microfilaments, microtubules, and intermediate filaments. The constituent of microfilament is actin which is the most abundant protein in cells. The globular actin is polymerized into the filamentous actin in the presence of adenosine triphosphate and divalent cations. The monitoring of these proteins is considerably important to investigate the mechanical and functional characteristics of cells. In current study, we demonstrate the optical measurement of actin polymers with different type of structures without any indicator. Our method has been employed to investigate the proteins. The absorption is useful to monitor the presence and concentration of sample in solution. Actin monomer, polymerized actin and bundle actin made by adding gelsolin and α-actinin provided clearly different result in photoluminescence. Each samples showed different emission feature for peak position and intensity. Using this *in vitro* result, we monitored the change of actin structure in usual cells. The photoluminescence based determination *in vivo* was significantly consistent with the result of dye based fluorescence images.

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Global climate change and microbial interaction in agri-aquaculture: Current research and future trends

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Understanding of microbial interaction in different ecosystems on Earth, such as soil, marine, freshwater, is essential for our ability to assess the importance of biogeochemical cycles and their response to climate change. Functions of microbial communities on the carbon and nitrogen cycles are predominantly important for producing greenhouse gases and sustainable agri-aquaculture. Their functions improve water quality and enhance immune system of cultured aquatic animals and produce bioactive compounds such as vitamins, hormones and enzymes. Some beneficial microbes also have a key role in reducing anthropogenic gases and increasing agri-aquaculture productions. Here, the structure and function of microbial communities and their contribution to agriculture and aquaculture productions at present and future trends, and how they respond to environmental change will be discussed.

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