

Nano Life Science Institute (WPI-NanoLSI) Open Seminar

Inert chamber system opens a new door to employ biomolecular motor protein systems for nanotechnological applications

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May 15th, 2018 (Tue) 16:00-17:00

Lecture Room 102 (Natural Science and Technology Main Hall)

Language: English

Organizer: WPI-NanoLSI

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Abstract

Owing to various attractive features over man-made machineries, biomolecular motor protein systems, e.g. microtubule-kinesin are becoming increasingly important in nanotechnology and finding potential applications for serving different purposes such as nano-transportation, detection, sensing, sorting and so on [2]. As a consequence, biomolecular motor protein systems are considered prospective functional components of integrated nano- or micro-devices. However, performance and longevity of those future devices will be limited by the short lifetime of the functional components i.e. biomolecular motor proteins, in synthetic environment, that is easily affected by any change in their surrounding environmental conditions. One of the threatening factors is the aggression of reactive oxygen species which can readily terminate the activity of the motor protein systems through denaturation [2]. In order to ensure sustainable applications of motor proteins in synthetic environment it is important to find a means that can be effective in protecting motor proteins from the adverse effect of reactive oxygen species. I developed a set up named 'Inert Chamber System' that is proved to be successful in protecting microtubule-kinesins from oxidative damage by reactive oxygen species and ensuring their prolonged activity [3]. The inert chamber system has been also effective in prolonged investigation of the active self-organization of microtubules [4]. Furthermore, using the inert chamber system I succeeded in studying the mechanical endurance, deformation and response of microtubules to mechanical stimuli [5,6]. Following the success, a new route has been developed to employ microtubules as a sensor for

characterizing surface mechanical deformation of soft materials [7]. These studies are expected to foster the applications of biomolecular motors in nanotechnology.

References

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