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On the assembly of kinesin-based nanotransport systems DANIEL OLIVEIRA, WPI-AIMR, Tohoku University, Japan, DOMYOUNG KIM, Department of Biomolecular Engineering, Tohoku University, Japan, MITSUO UMETSU, Department of Biomolecular Engineering, Tohoku University, Japan; WPI-AIMR, Tohoku University, Japan, TADAFUMI ADSCHIRI, WPI-AIMR, Tohoku University, Japan, WINFRIED TEIZER, Department of Physics and Astronomy, Texas A&M University, USA; WPI-AIMR, Tohoku University, Japan — The ongoing pursuit to construct an artificial functional nanorobot has been preceded by biological equivalent long ago. Many proteins act at the nano-scale as biological motors for rotation or translation, being responsible for many fundamental processes. Among these proteins, kinesin is considered a promising tool in the development of synthetic nano-machines. The kinesin protein is a well known naturally occurring molecular machine capable of cargo transport upon interaction with cytoplasmic systems of fibers, known as microtubules. Conversion of chemical energy into mechanical work, harnessed by the hydrolysis of ATP, propels kinesin along microtubules. Even though recent efforts were made to engineer tailor-made artificial nanotransport systems using kinesin, no systematic study investigated how these systems can be built from the bottom up. Relying on the Surface Plasmon Resonance technique, we will show for the first time that it is possible to quantitatively evaluate how each component of such nanoscopic machines is sequentially assembled by monitoring the individual association of its components, specifically, the kinesin association to microtubule as well as the cargo-kinesin association.

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