First success in real time observation of process of solubilization of CNT by polymer

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NIMS researchers have succeeded for the first time in the world in real-time analysis of the "polymer wrapping" process by which polymers (polymers of molecules) wrap around single-walled carbon nanotubes, which are a next-generation material.

Carbon nanotubes (CNT) are a promising new material, which are expected to find diverse applications in the fields of soft electronics suing organic materials, chemical sensors, fuel cells, etc. and the environment-friendly green life sciences. However, the fact that CNT are extremely difficult to dissolve in water and organic solvents had been an obstacle to both basic research and practical applications. Much research has been done on polymer wrapping, in which CNT are enclosed in and dissolved by polymers, as an effective solution to this problem. However, it had not been possible to observe in real time the mechanism by which polymers wrap around CNT and, as a result, how the CNT are solubilized.

This research was carried out using the "stopped-flow method," which is one technique for analyzing instantaneous dynamic structural changes in biomolecules such as proteins, DNA, etc. As a result, the team succeeded for the first time in the world in analysis of the dynamic polymer wrapping behavior of CNT.

Although CNT had been difficult to dissolve in solvents, these research results not only clarified the mechanism of polymer wrapping, which had long remained unexplained, but also provide a key technology for

mass production and practical application by enabling solubilization of CNT by polymer wrapping. These results are expected to contribute to efficient production, for example, by development of new solubilizing agents.

These results were published in the online bulletin of the American scientific journal, Journal of the American Chemical Society, on January 17, 2013 (Japan time).

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