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Masahiro Goto

National Institute for Materials Science, Japan

Nanostructured functional organic materials synthesized by a laser irradiation method for applications of molecular devices and high-sensitive sensors

Organic materials have caught much attention for their potential application in gas sensors, lasers, and organic field-effect transistors. For realizing such devices using organic molecules, it is necessary to generate nanostructured organic materials and to manipulate them onto the appropriate position of electric circuits. We have succeeded in developing a novel fabrication technique to synthesize nanostructured functional organic materials such as functional polymer nanowires and organic molecular nanoaggregates by a pulsed laser irradiation method. Polymer nanowires were generated by sub-nanosecond pulsed laser irradiation, and time-resolved shadowgraphy images of the growth of the polymer nanowires with uniform diameter at atmospheric pressure were recorded. Nanoparticles of FeO doped polymer nanowires were also successfully synthesized using this method. A plausible mechanism of polymer nanowire synthesis was proposed. Furthermore, a molecular nanojet in water, generated by the pulsed laser irradiation, has been successfully observed by the time-resolved observation method. The molecular nanojet was ejected through the center of a cavitation bubble, which was also generated by the laser irradiation in water. This observation shows us the generation process of the molecular nanojet. These techniques are expected to be utilized in a wide range of applications such as fabrication of molecular devices and ultrahigh-sensitivity sensors in the future.

Biography

Masahiro Goto has completed his PhD from Nagoya University, Japan and Post-doctoral studies from Institute for Molecular Science, National Institute of Advanced Industrial Science and Technology and Japan Atomic Energy Research Institute. He is the distinguished Chief Researcher of Center of Green Research on Energy and Environmental Materials in NIMS. He has published more than 92 papers in reputed journals.

GOTO.Masahiro@nims.go.jp

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