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SELF-ASSEMBLED ORGANIC/POLYMERIC MICRO LASERS AND PHOTO SWITCHABLE ARRAYS

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Optical micro cavities play an important role for the next-generation light technology. Recently, we succeeded in fabricating spherical microcavities from π-conjugated polymers (CPs) by simple self-assembly process. We found that the microcavities exhibit whispering gallery mode (WGM), resonant photoluminescence (PL) upon focused laser excitation, where PL generated inside the sphere is confined via total internal reflection at the polymer/air interface. The resonance occurs when the wavelength of the light is an integer multiple of the circumference of the microsphere. The CP-based microcavities have benefits to the conventional microcavities in the following points: simple and low-energy fabrication process to obtain well-defined microspheres, the micro cavities act as both cavity and emitter, the micro cavities possess high refractive index and photo absorptivity, potent use for electrically-driven WGM and laser oscillation. In this presentation, recent results on the fundamentals of the self-assembly of the CPs, resonant PL from the CP microspheres, intra- and inter-sphere light energy conversion, and optically-pumped lasing will be discussed. Photo-switchable WGM, mode splitting, and microdisk arrays are also presented.

Biography

Yohei Yamamoto has completed his PhD from Osaka University and Post-doctoral studies in the University of Tokyo and Japan Science and Technology Agency. He moved to University of Tsukuba on 2010 as Assistant Professor, and then promoted to Full Professor on 2018. He has published more than 60 papers in reputed journals. His research interests are self-assembly of molecules and polymers to form microcavities for lighting and lasing.

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