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先端光量子科学アライアンス 談話会



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光量子科学研究センター セミナー

東京大学 G-COE プログラムー未来を拓く物理科学結集教育研究拠点ー



G-COE Seminar

“Glass-metal nanocomposites for photonic applications”

Prof. Yuri P. Svirko

(Department of Physics and Mathematics,

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日 時 : 平成 24 年 12 月 11 日(火) 16:00-17:30

場 所 : 東京大学理学部1号館2階 201B 号室

Abstract

Glasses embedded with metal nanoparticles are often referred as Glass-metal nanocomposites (GMN) and combine either properties of metals or dielectrics. Surface plasmon resonance associated with conduction electrons oscillations dominates optical properties of GMN. In particular, in the vicinity of the surface plasmon resonance, GMN exhibit a strong optical nonlinearity, which exists as long as excited electrons cool down via electron-phonon coupling. The concentration of the silver, gold and copper nanoparticles in glass matrix can be controlled by applying external voltage at elevated temperature. This effect is referred to as electric field assisted dissolution (EFAD) and makes GMN even more attractive for photonics applications. This is because EFAD allows one to imprint the electrode profile in the nanoparticle distribution in the subsurface layer as dissolution takes place only at electrode-GMN contact spots. This process can be employed to fabricate one- and two-dimensional planar photonic structures with element size of as low as 100 nm and sub-micron periodicity.

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