平成 29 年 5 月 8 日

応用物理学会北海道支部
会員各位

応用物理学会北海道支部

講演会のお知らせ

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演題：Synthesis processes in pulsed laser ablation in liquids
講師：David AMANS 氏
（Institut Lumiere Matiere, Universite Claude Bernard Lyon 1; Dr.-Ing. ）
日時：平成 29 年 6 月 12 日（月） 13:30～14:30
場所：北海道大学工学部 A4-63
主催：応用物理学会北海道支部

講演の要旨

Pulsed laser ablation in liquids (PLAL) is a versatile technological approach to producing nanoparticle colloids with ligand-free or functionalized surfaces. Following a comprehensive overview on PLAL method, I would like to show our last breakthroughs on the understanding of the synthesis processes. Nowadays, this popular technique is increasingly employed, but the underlying mechanisms are not fully understood yet. In a first step, a laser interacts with a bulk target, creating a hot and dense plasma. The energy exchange between the plasma and the liquid, and the rapid expansion, result in plasma quenching after few microseconds. Then, numerous authors reported the formation of a bubble from which nanoparticles are released. According to small angle x-ray scattering measurements, the bubble cavity should support nucleation and growth of nanoparticles. However, two fundamental features remain largely unknown: the chemical composition and the thermodynamic variables within the bubble. Using time-resolved plasma spectroscopy and ultrafast imaging, we address both issues and we provide a picture of the thermodynamic variables inside the bubble. We can then discussed different scenarios including shockwave induced phase transition (for diamond), vapour phase

chemistry (supported by a fully microscopic approach based on a first-principle study), and phase transitions induced by laser pulses. This approach is illustrated in the framework of oxide nanoparticles (alumina, lanthanide oxide) and diamond nanoparticles.

世話人　越崎　直人
北海道大学　大学院工学研究院　量子理工学部門
電話：011-706-5594　koshizaki.naoto@eng.hokudai.ac.jp