



64th RAP Seminar

The 64th Seminar on RIKEN Center for Advanced Photonics

Language: Japanese

Date: **August 2(Fri) 16:00 - 17:00, 2019**

Location: **1F Seminar Room, RIKEN Sendai Campus**

(理研 仙台地区 1階セミナー室)

Wako Campus: **Cooperation Center, 3F, W319, TV relay**

(和光：研究交流棟3階会議室 W319 (TV会議))

Title: **Terahertz Light Amplification and Lasing in Graphene-Channel Transistor Structures**

グラフェンチャネルトランジスタ構造におけるテラヘルツ波の増幅およびレーザー発振

Speaker: **Prof. Taiichi OTSUJI**

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This talk reviews recent advances in terahertz light amplification and lasing in current-driven graphene-channel transistor structures. Graphene can yield the optical gain in the terahertz region under optical or current-injection pumping due to its gapless and linear band structure. First we demonstrate single-mode lasing and amplified spontaneous broadband emission at 100K in a distributed feedback dual-gate graphene-channel transistor structure. Second we introduce graphene plasmon dynamics into the transistor with an asymmetric dual-grating-gate structure to dramatically improve its gain, threshold operating temperature as well as emission intensity. At room temperature we observe rather large amplification of terahertz radiation with a gain up to 9% stimulated by the current-driven graphene plasmon instability. Incorporation of these two operation mechanisms into a single transistor structure will be a promising way to realize room-temperature, intense terahertz lasing in a solid state device.