

Laser stimulated broadband emission of graphene

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Graphene foam emission



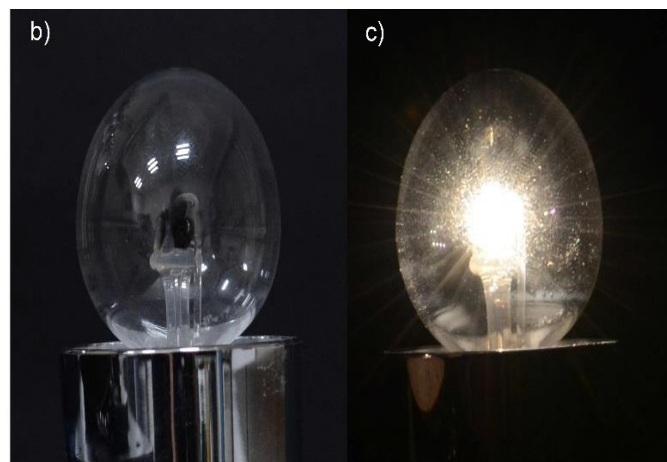
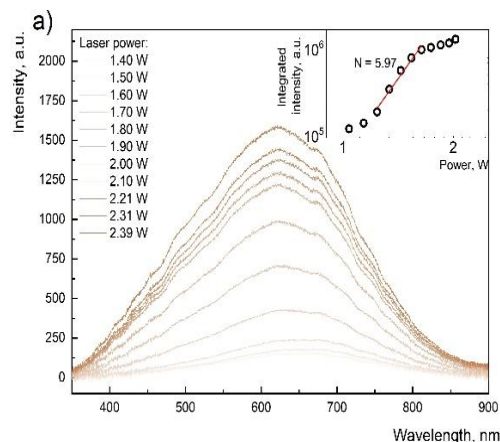
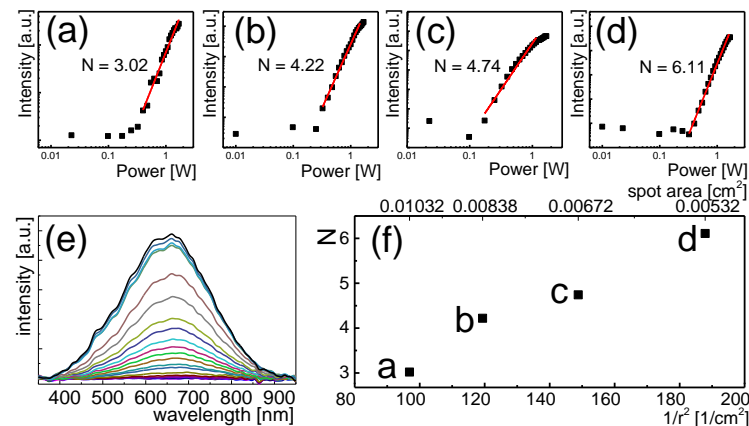
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Laser induced white lighting of graphene foam

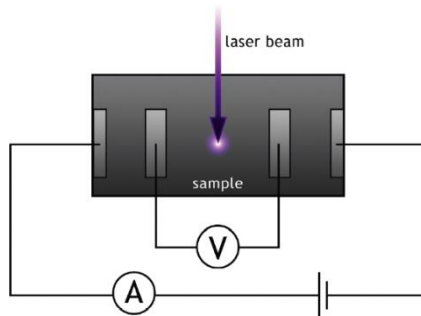
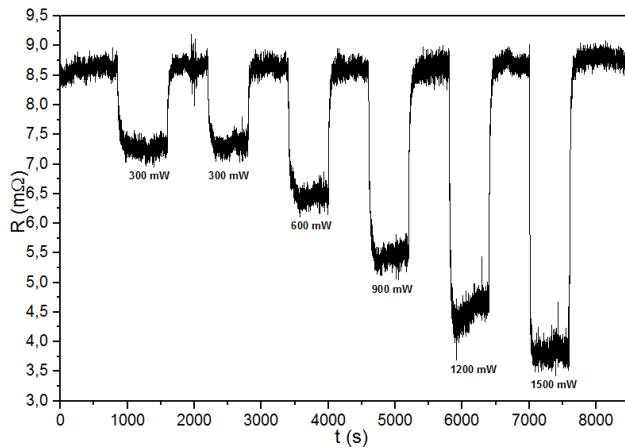
Wiesław Strek, Robert Tomala, Mikołaj Łukaszewicz, Bartłomiej Cichy, Yuriy Gerasymchuk, Paweł Gluchowski, Łukasz Marciniak, Artur Bednarkiewicz & Dariusz Hreniak

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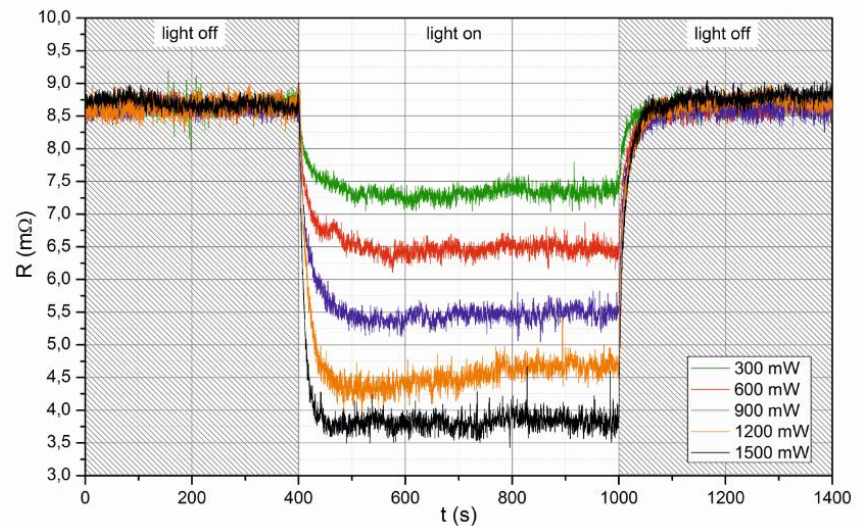


Photocurrent measurements

Temporal change in the sample resistivity

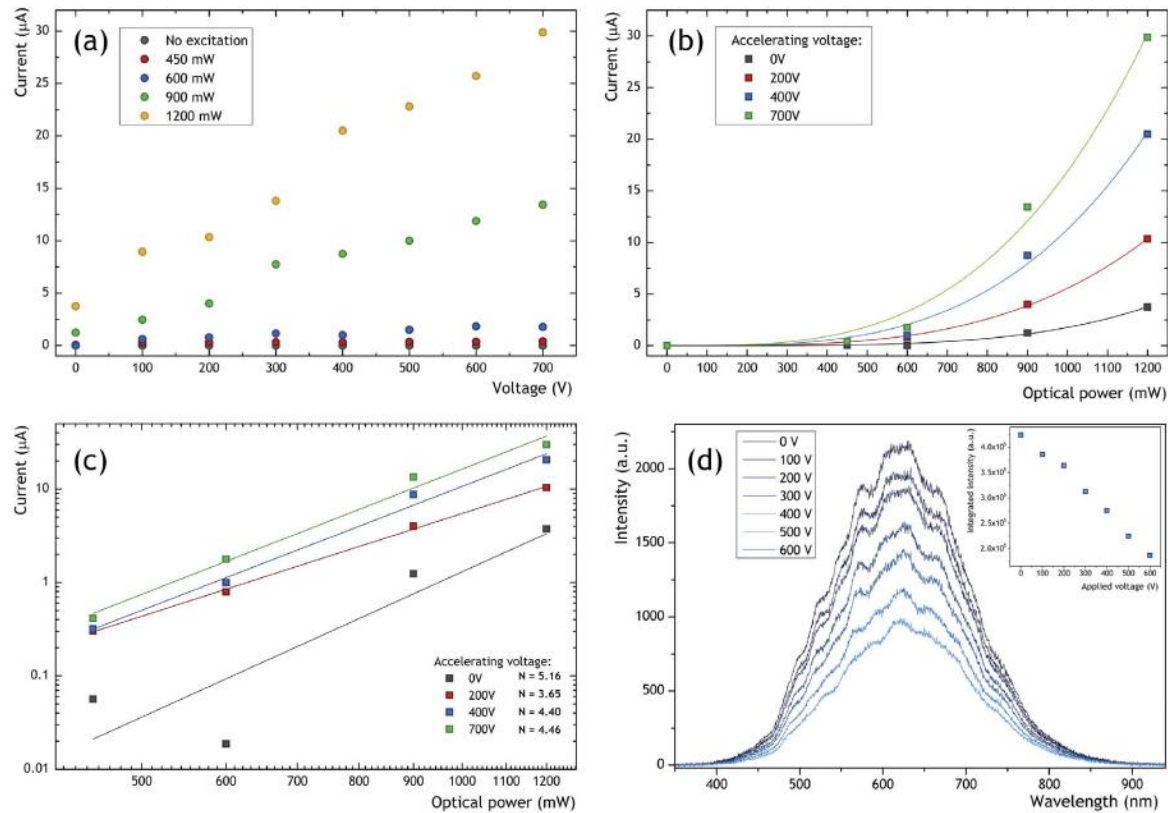


Single turn on/turn off resistance changes

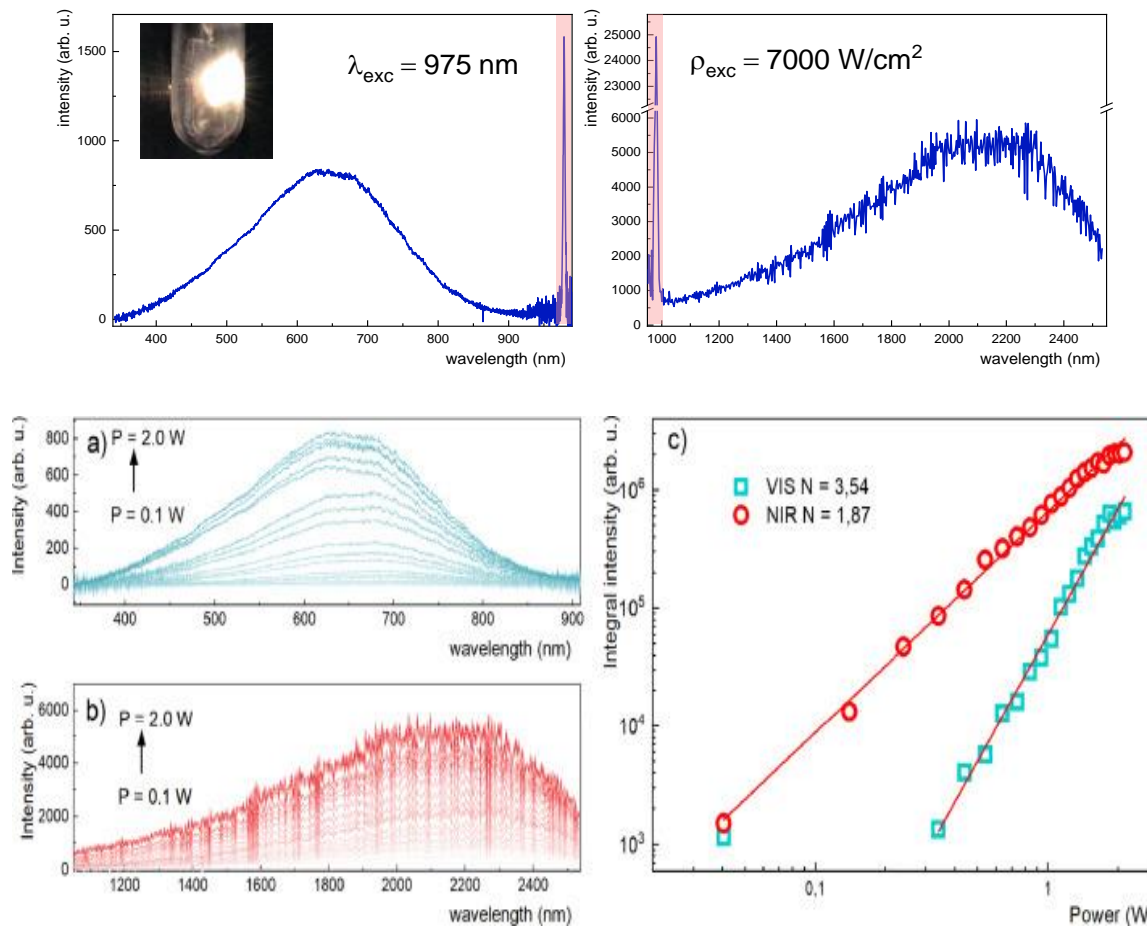


Photocurrent measurements + hot electrons generation

Applied electric field influence



Visible and NIR broadband emission



Coherent white emission of graphene

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AFFILIATIONS

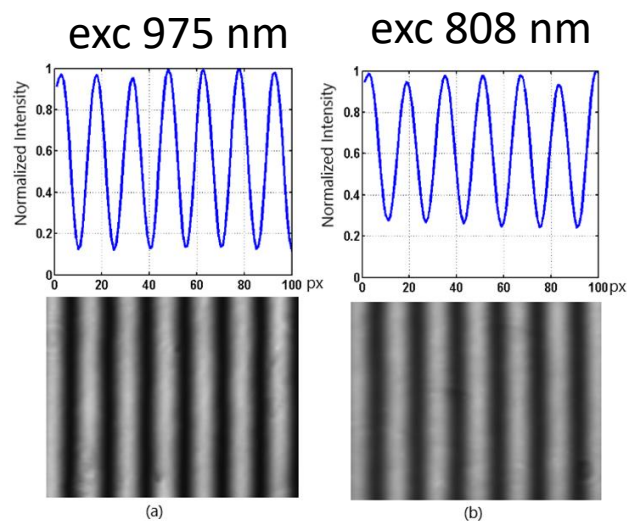
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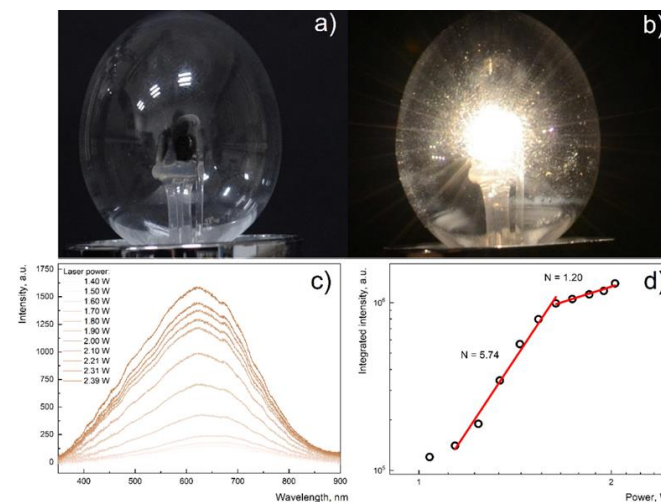
Interference



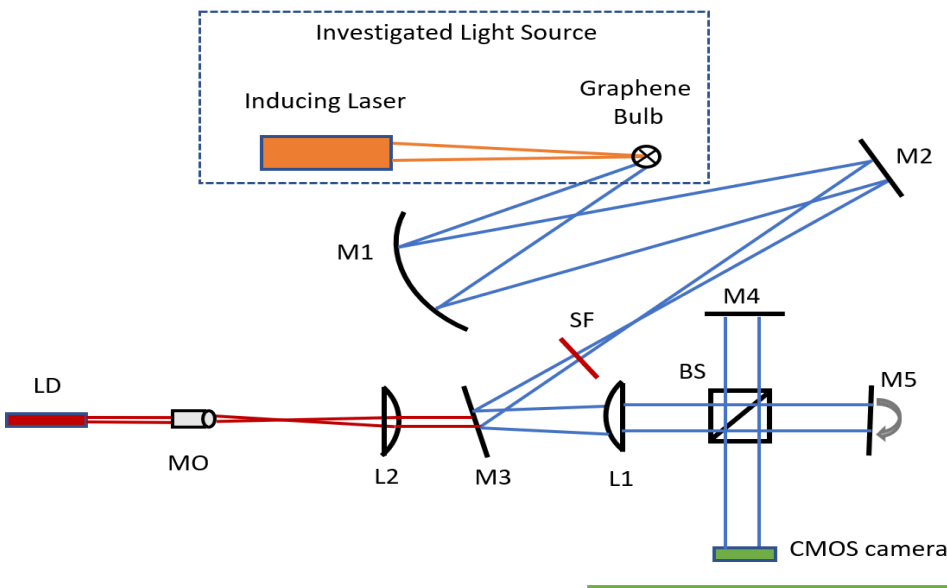
Graphene bulb

without exc

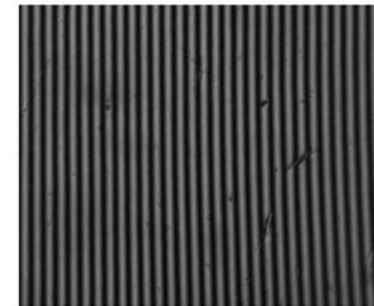
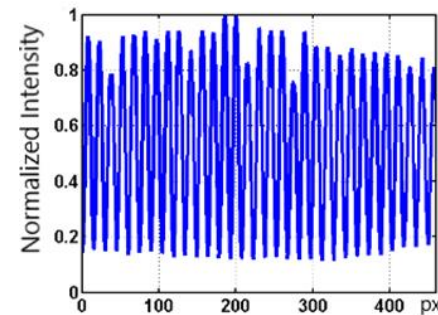
exc 975 nm



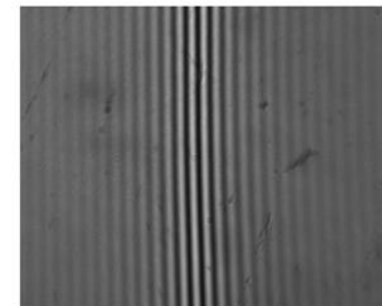
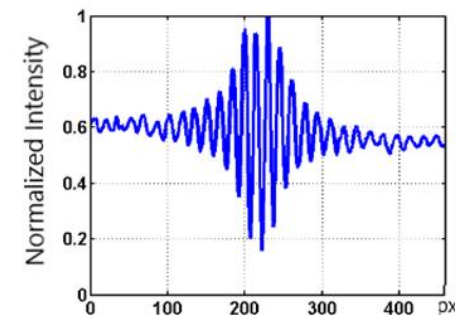
Measurement setup



The registered interference



(a)

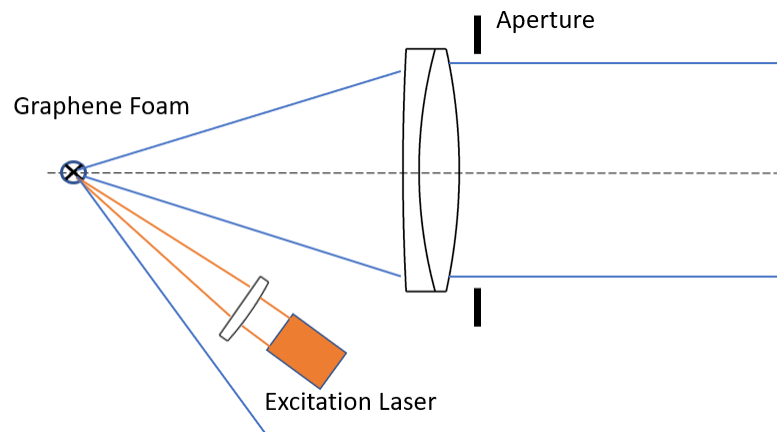


(b)

Registered fringes with and without spectral filter

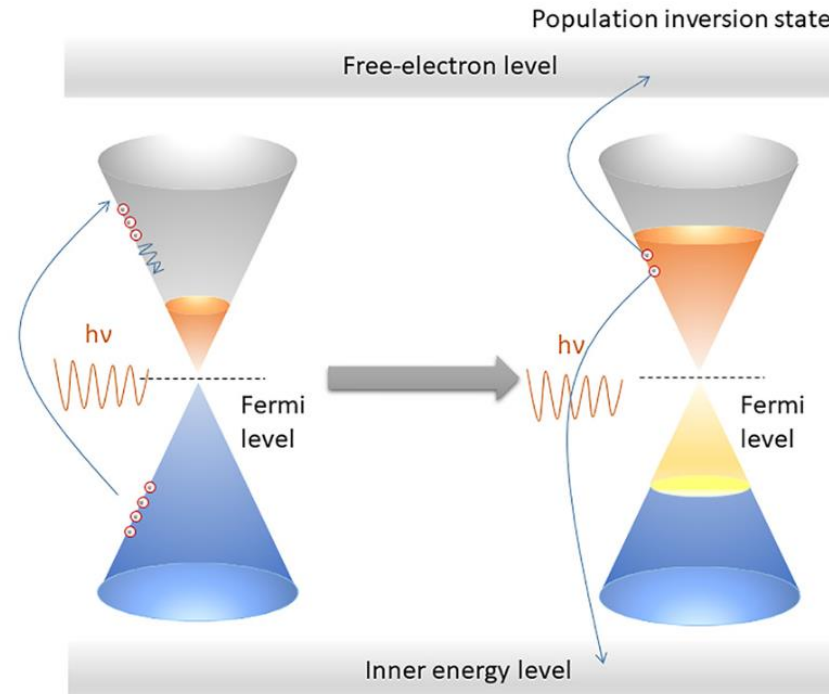
Point-like source of white light based on graphene excited by a CW laser

- a point-like white light source with a high degree of spatial coherence
- a possibility to obtain a collimated beam of white light with low divergency angle

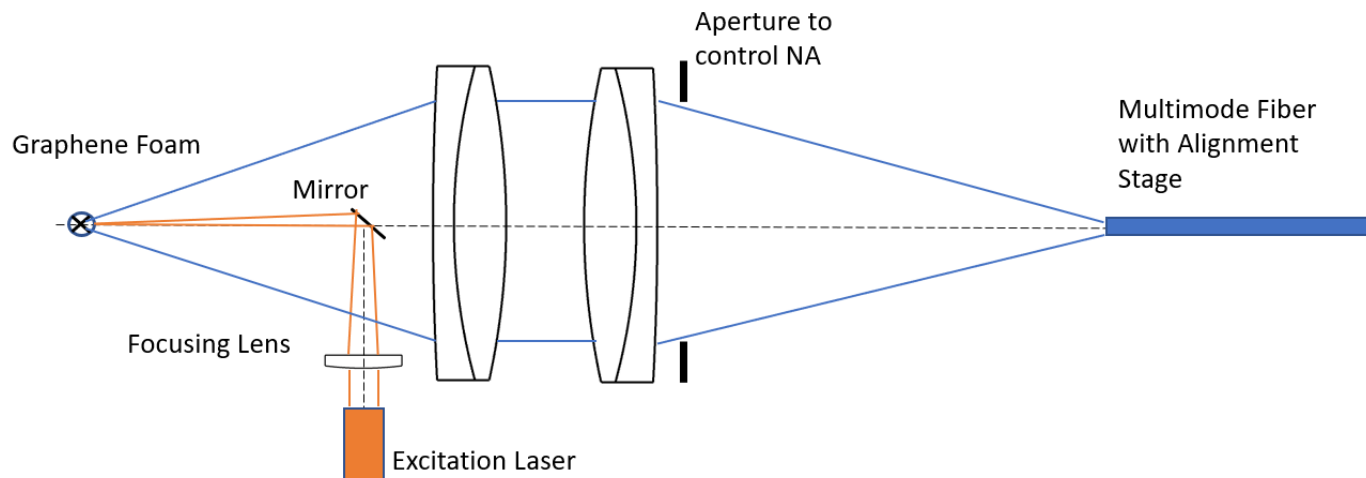


Layout of a light source producing broadband collimated beam

- ✓ Inversion of population
- ✓ Coherence
- ✓ White laser???



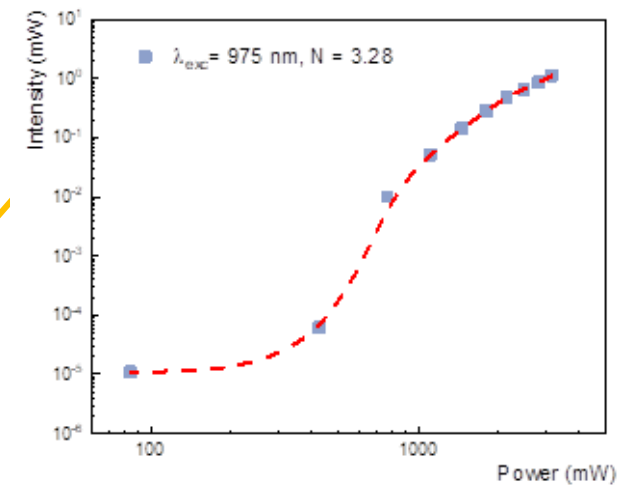
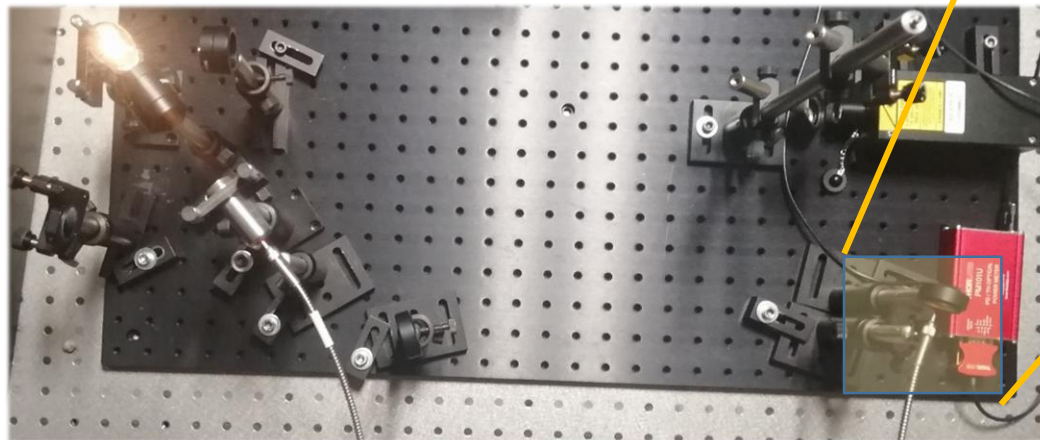
- point-like emission area matching the core size of a typical multimode fiber



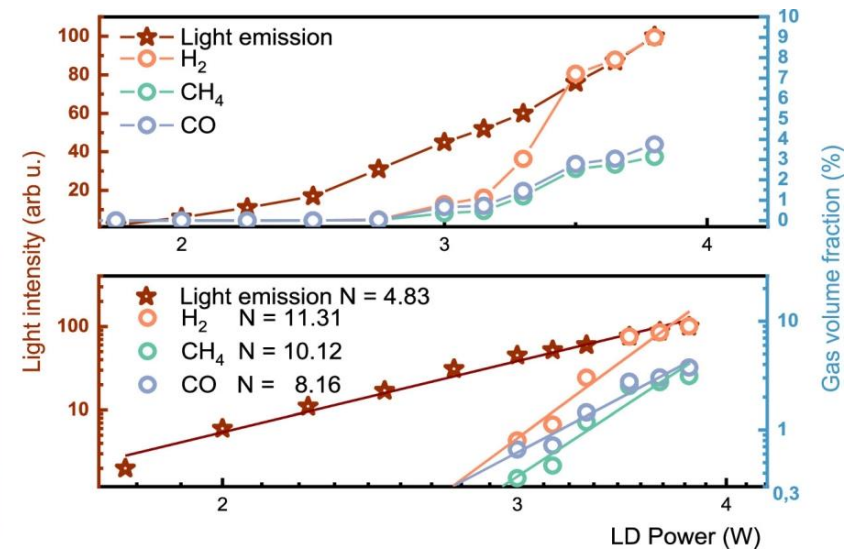
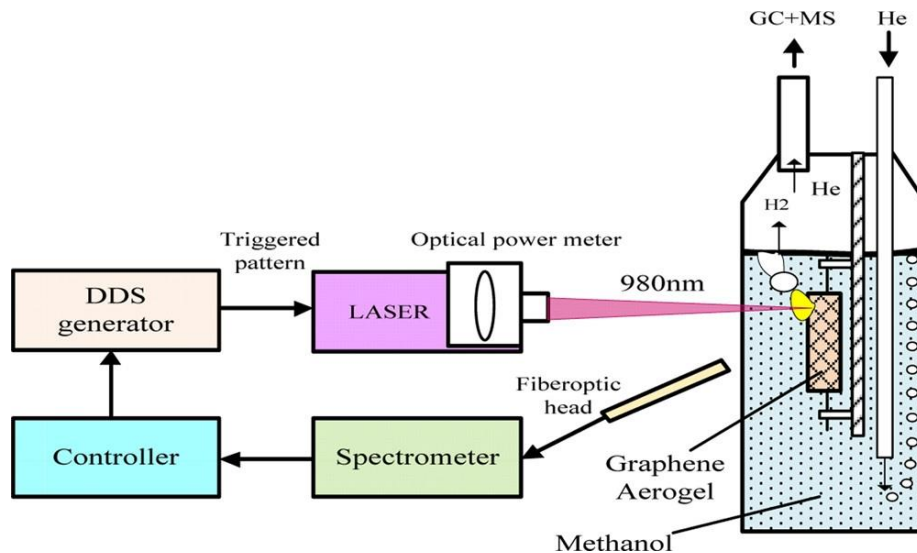
Layout of a potential broadband fiber light source

Insights

- emissivity depends on morphology, porous structure of graphene foam is an advantage
- emissivity higher than for an electric lamp with tungsten filament
- decay of light power over time



Other application of ionization of graphene surface by laser



The generation of hydrogen from alcohols and water



Thank you for attention !