Ex-situ vs. in-situ fabrication routes for solid luminescent nanocomposites C-dots/porous silica

G.Yu. Rudko, O.F. Isaieva, A.V. Vasin, D.V. Kysil, E.G. Gule, B.Capoen, M. Bouazaoui, H. El Hamzaoui, S.V. Sevostianov, A.N. Nazarov

[1]*V. Lashkaryov Institute of Semiconductor Physics of National Academy of Sciences of Ukraine, 45, Pr. Nauky, Kiev, 03028, Ukraine. E-mail: oksana.isaieva@isp.kiev.ua*

[2]*National University "Kyiv-Mohyla Academy", Skovorody, 2, Kiev, 04070, Ukraine.*

[3]*National Technical University Igor Sikorsky Kyiv Polytechnic Institute", Kyiv 03056, Ukraine*

[4]*Univ-Lille, CNRS, UMR8523 – Physique des Lasers AtomesetMolequles, CERLA/IRCICA, F-59000, Lille, France.*

[5]*Chuiko Institute of Surface Chemistry of NASU, Kyiv, Ukraine.*

Motivation

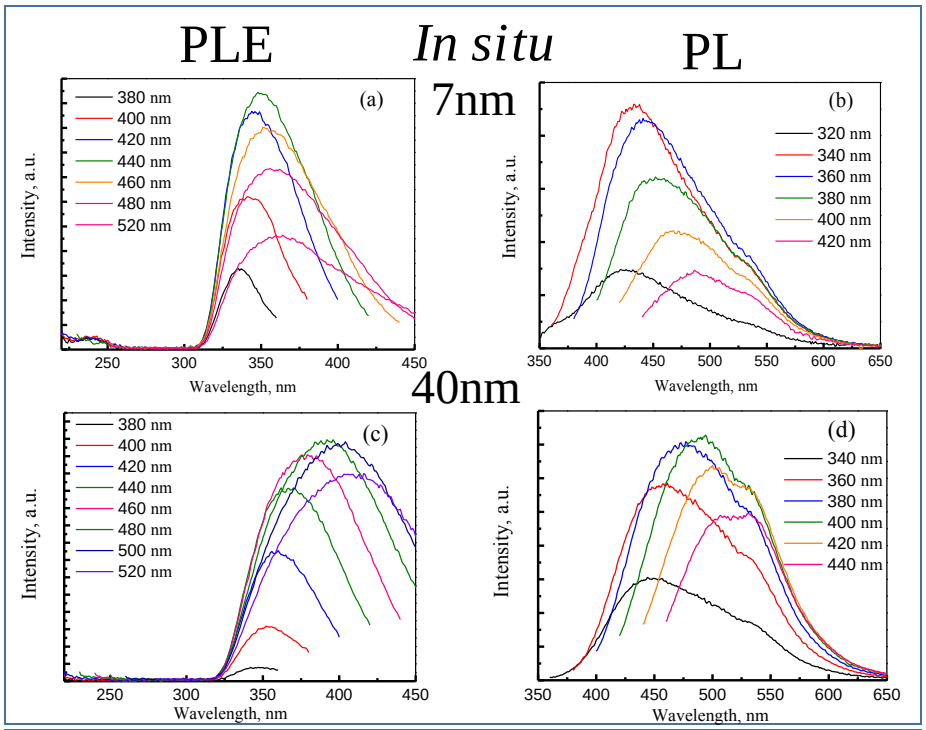
Carbon nanoobjects - effective light emitters. Promising for: fabrication of light-emitting devices and bio-medical applications(e.g., disease diagnostics). Advantages: comparative cheapness, environmentally friendly fabrication routes and wide spectrum of possibilities to control their color properties

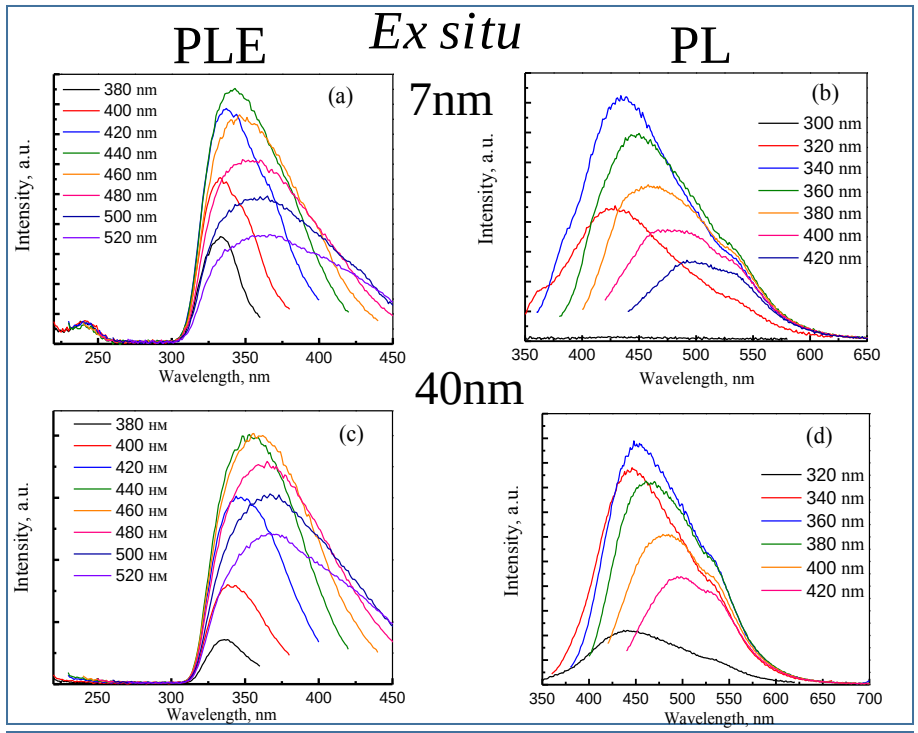
Goal

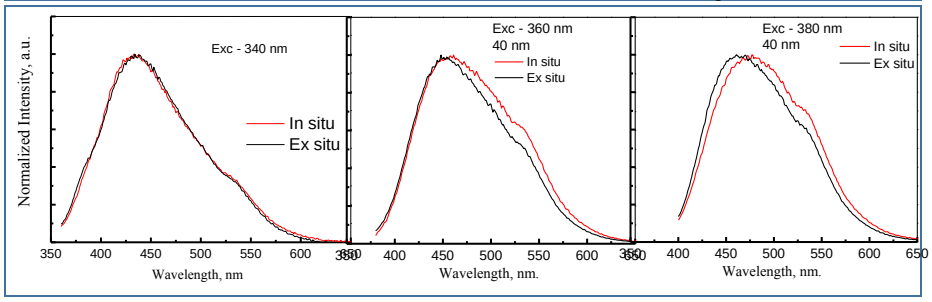
To study light-emitting properties of C-dots prepared by two methods of growth using of porous SiO_2 as a templates.

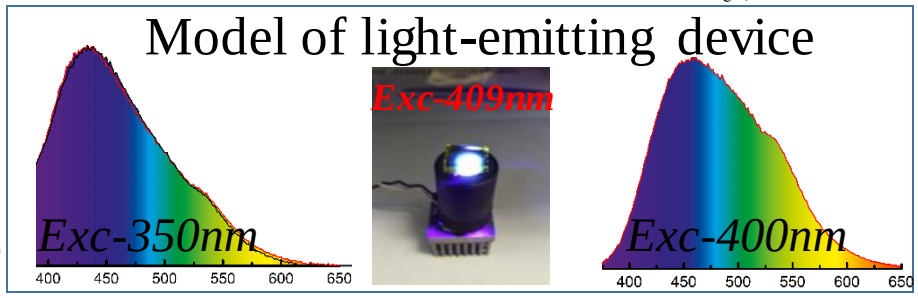
Synthesis routes

PLE &PL spectra of water colloids of C-dots









Conclusions

- Both methods provide nanoparticles with almost the same properties.
- Using the matrix with pores sizes 40 nm provides the material with a little wider size distribution of nanoparticles.
- It is proposed model of light-emitting device based on C-dots in porous silica.