

# Carbon quantum dots synthesis and characterization

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Název projektu: Mezinárodní spolupráce v oblasti "in vivo" zobrazovacích technik

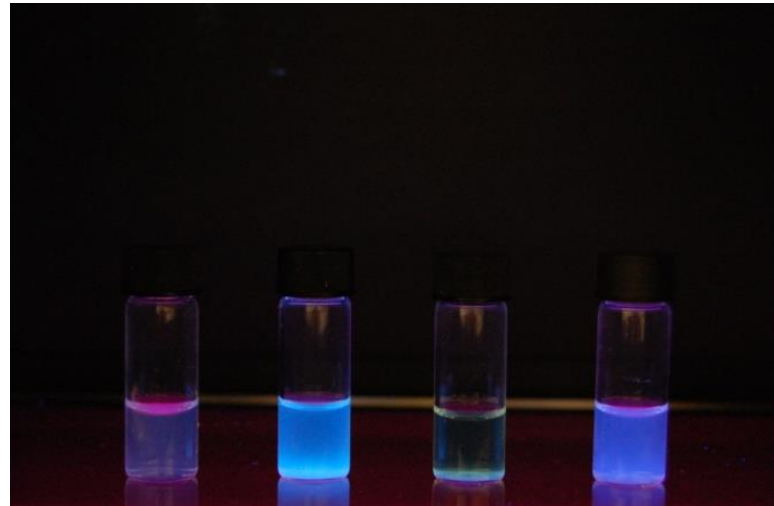


# Characteristics

- type of nanomaterial with nanocrystal structure
- crystal size  $< 10$  nm in diameter
- importance of CQD is reflected in his electronic, mechanical, chemical and optical properties
- using of CQDs in different fields of research such as catalysis, sensing, bioimaging, tissue engineering, optoelectronic and electronic devices
- chemical stability, biocompatibility, good colloidal stability, low cost and low toxicity



Spectral range from 420 to 490 nm



CQDs under UV light

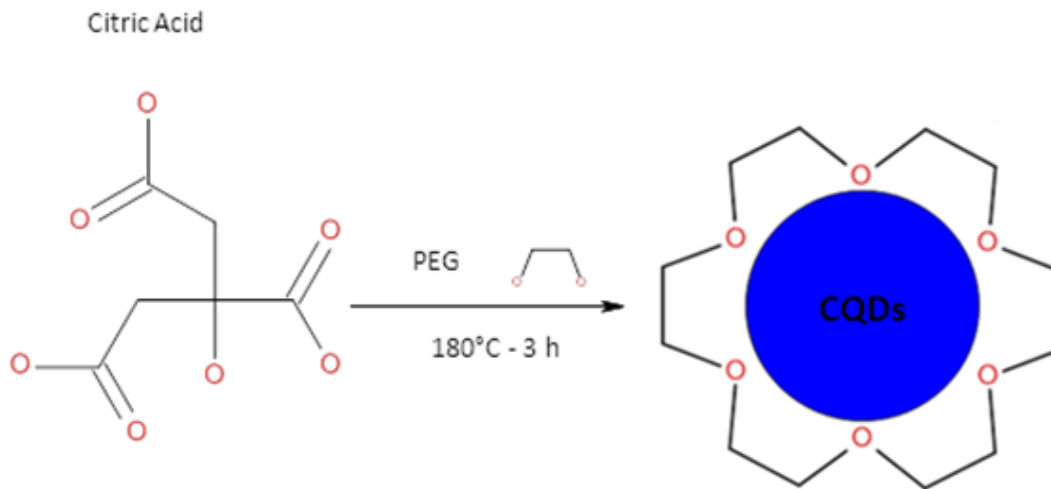
# Synthesis of CQDs

## Source

- citric acid
- ascorbic acid

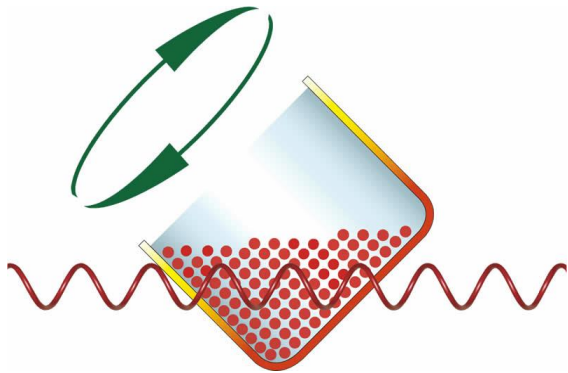
## Capping agents

- PEG
- PVP
- PEI
- BSA

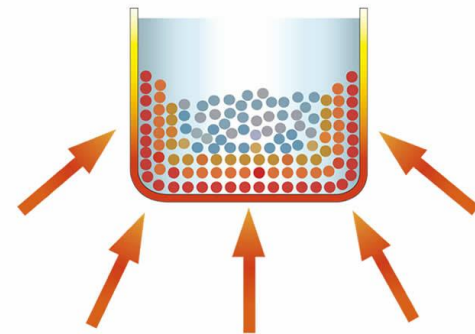


# Synthesis of CQDs

- pyrolysis
- electrochemical exfoliation
- acidic oxidation
- laser ablation
- thermal oxidation



**microwave irradiation**

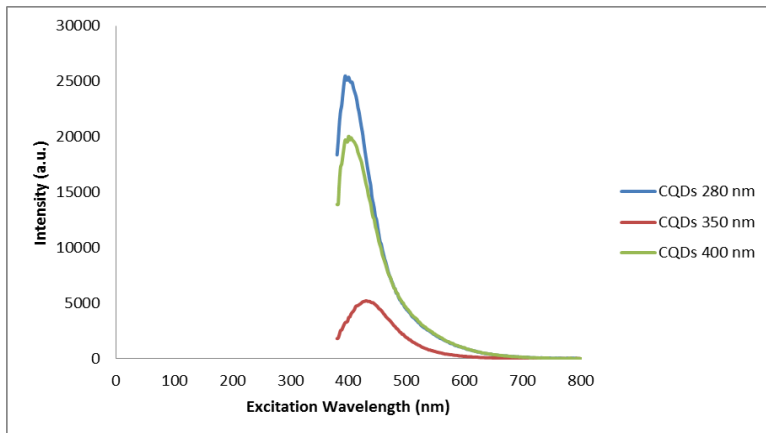


**hydrothermal treatments**

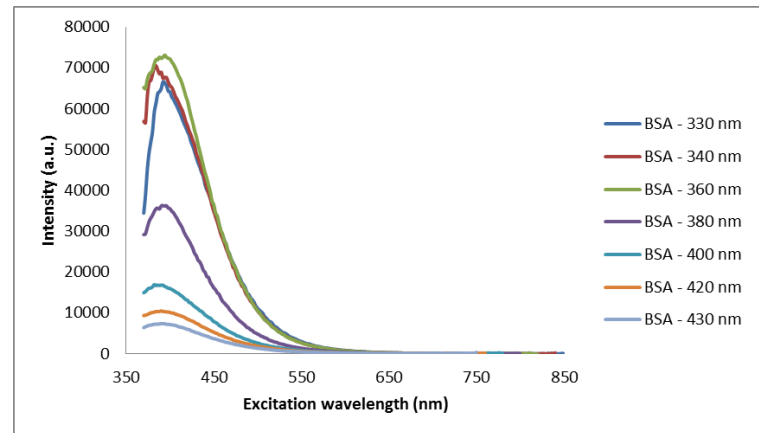
# Characterization of CQDs

- absorption spectra and fluorescence spectra of CQDs

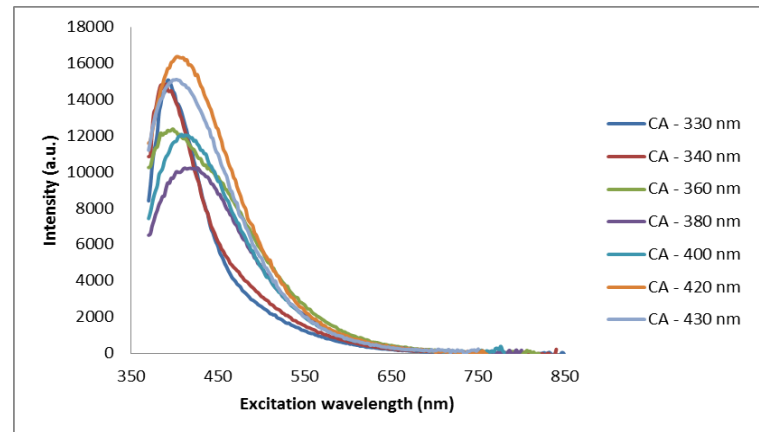
1



2

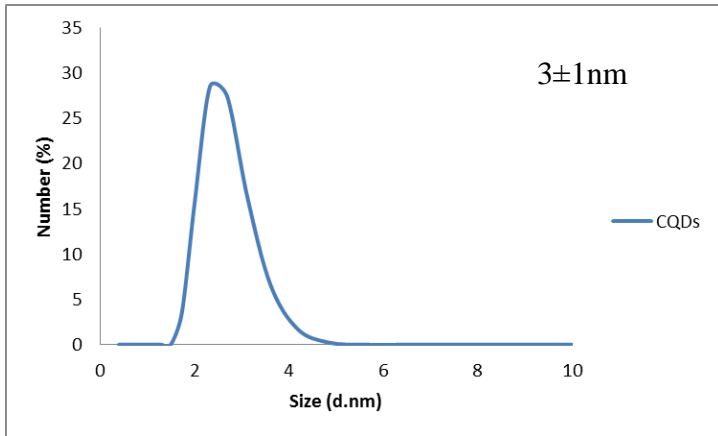


3

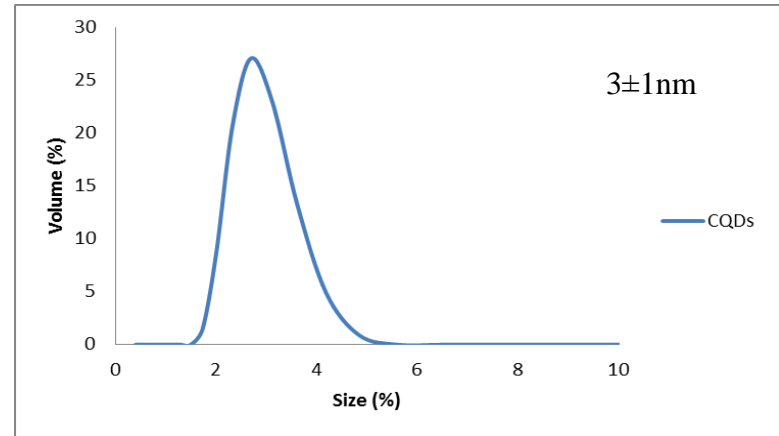


1. Citric acid capping with PEG
2. Citric acid capping with BSA
3. Citric acid capping with PVP

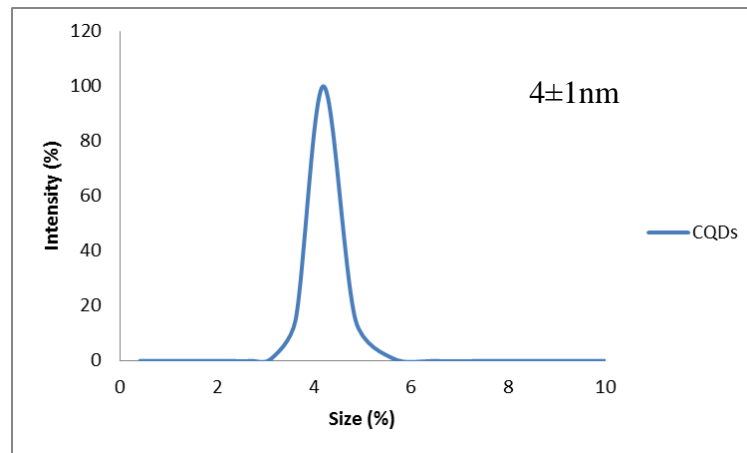
- Dynamic light scattering (DLS) measurement of CQDs



Size distribution by number

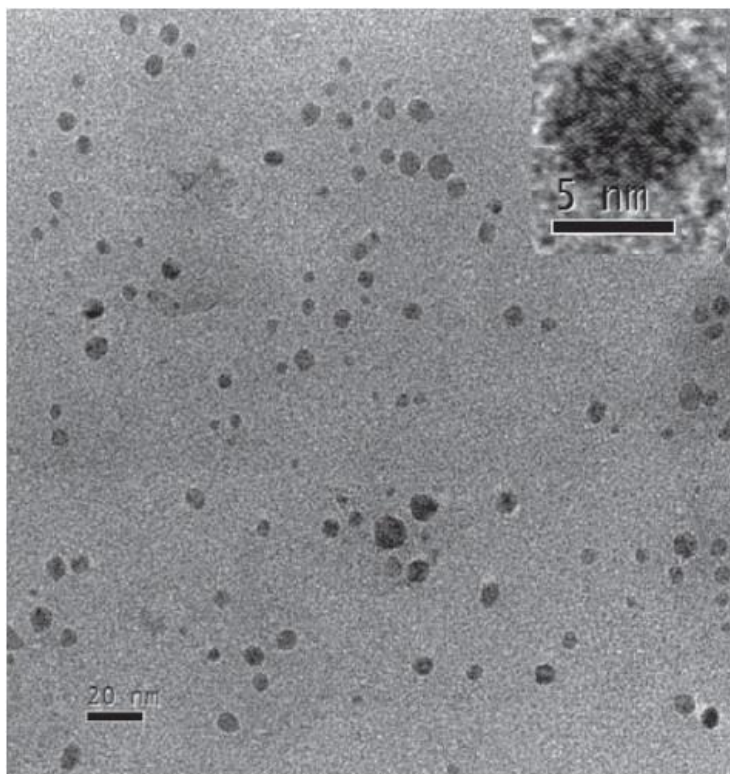


Size distribution by volume

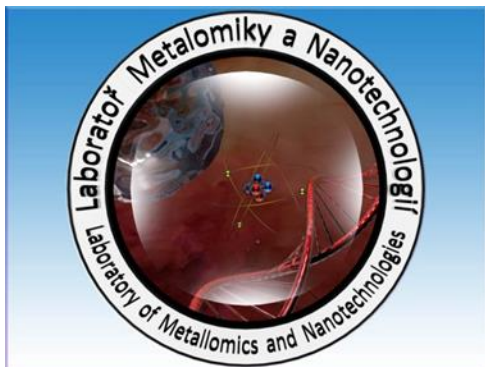


Size distribution by intensity

- transmission electron microscopy (TEM) measurements



Monodisperse nanocrystals of near spherical morphology with an average diameter of 6.2 nm.



Thank you for your attention



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