VISUALIZATION OF PROTEINS SEPARATED BY SDS-PAGE ELECTROPHORESIS UTILIZING PROTEIN-QUANTUM DOTS INTERACTIONS

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Introduction:

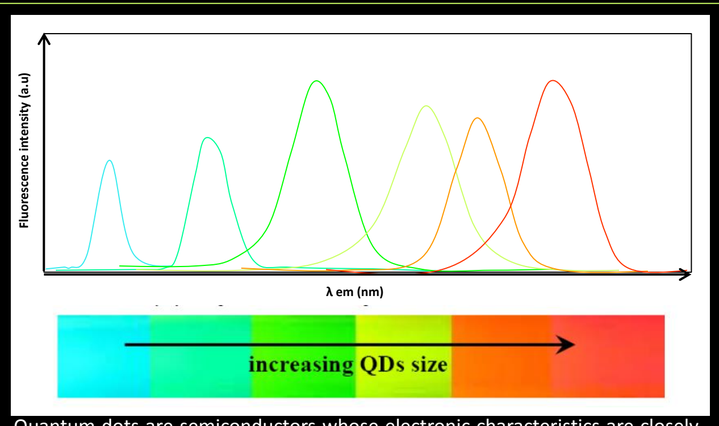
Polyacrylamide gel electrophoresis in presence of SDS (SDS-PAGE) is one from the most commonly used separation technique for complicated protein samples. For detection of protein in the gel traditional methods such as Coomassie-blue or silver staining are used. These methods vary in the sensitivity and time required for analysis. Compared to silver staining Coomassie-blue staining not so laborious, but it has lower sensitivity, but it is quantitative. Both staining methods are hardly reversible and incompatible with further analysis like mass spectroscopy, so their numerous modifications have been developed Except this other methods compatible with western-blotting are used like imidazole-zinc salts, SYPRO, amidoblack or fluorescent stains

Colloidal and semicolloidal nanocrystals, referred as quantum dots or QD have attracted much attention because of potential applications in biological markers by combining the advantages of ultrasensitive photoluminiscence, high photobleaching treshold, good chemical stability and tunable spectral properties.

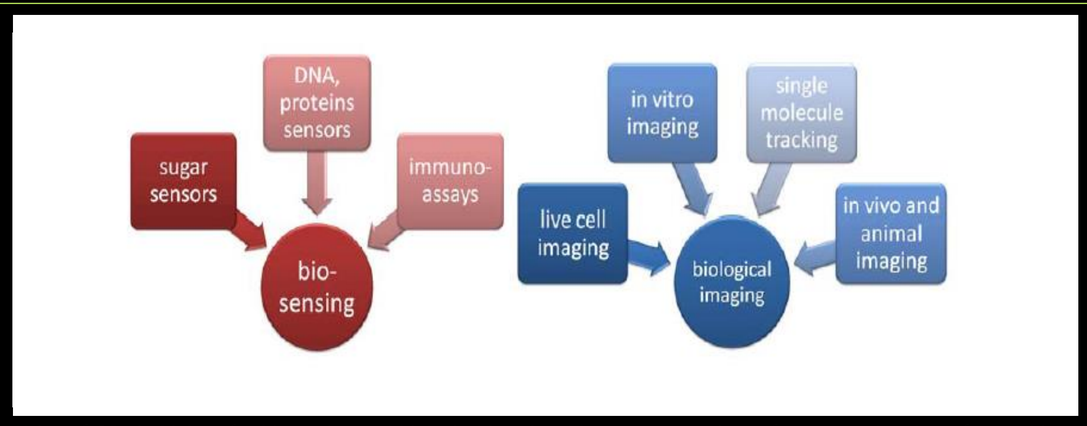
Interaction of bare QD with proteins is known and it has been previously used for proteins staining in the gel. The authors used red CdTe QD for proteins detection after native electrophoresis .

Aim

The aim of this work was to test the utilization of unspecific interaction of red and yellow CdTe quantum dots with proteins for staining of SDS-PAGE gels.



Quantum dots are semiconductors whose electronic characteristics are closely related to the size and shape of the individual crystal. Emission wavelenghth of quantum dots is dependent on their size varyiong fron units of nm (blue) to tens of nm (red).

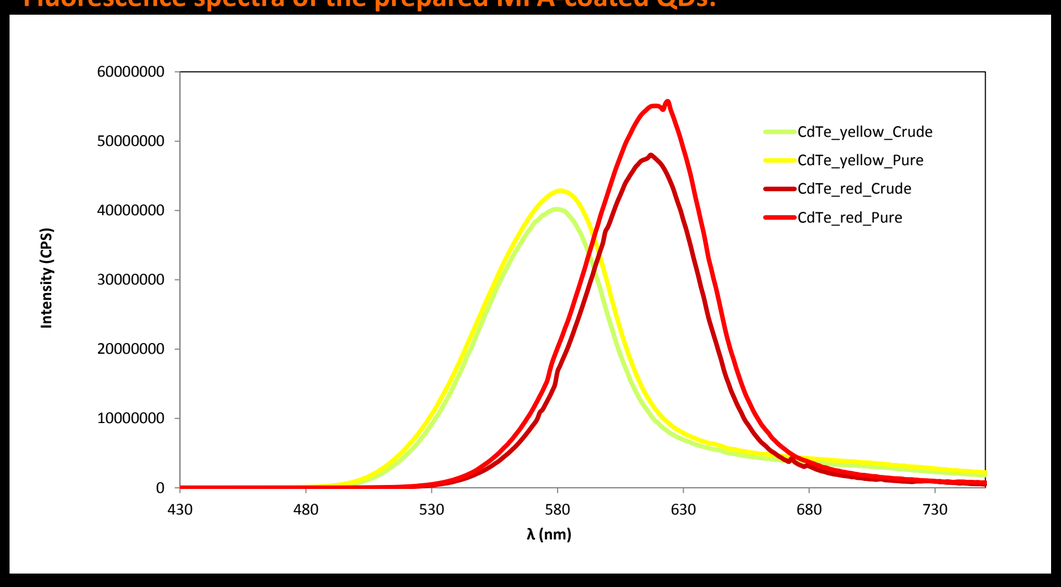


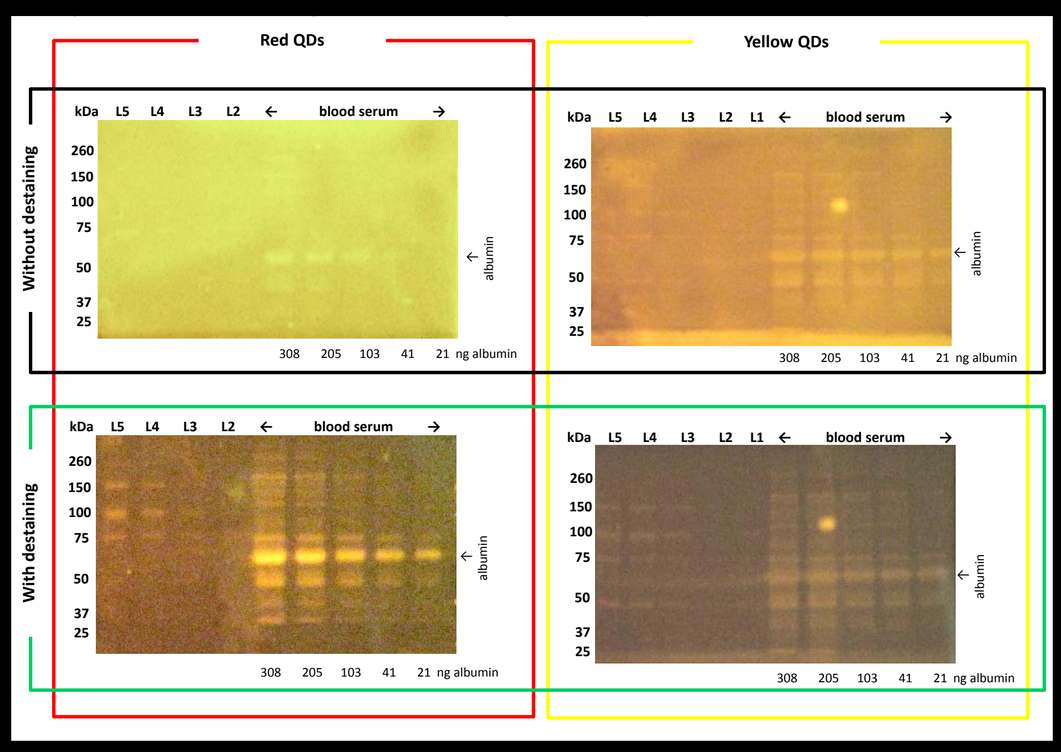
Using of QDs in biology for biosensing and biological imaging. The new generations of quantum dots have far-reaching potential for the study of intracellular processes at the single-molecule level, high-resolution cellular imaging, long-term in vivo observation of cell trafficking, tumor targeting, and diagnostics.

Photography of the fabricated CdTe MPA-coated QDs under UV irradiation. Potential cutting-edge application of quantum dots is being researched, with quantum dots acting as the inorganic fluorophore for intra-operative detection.

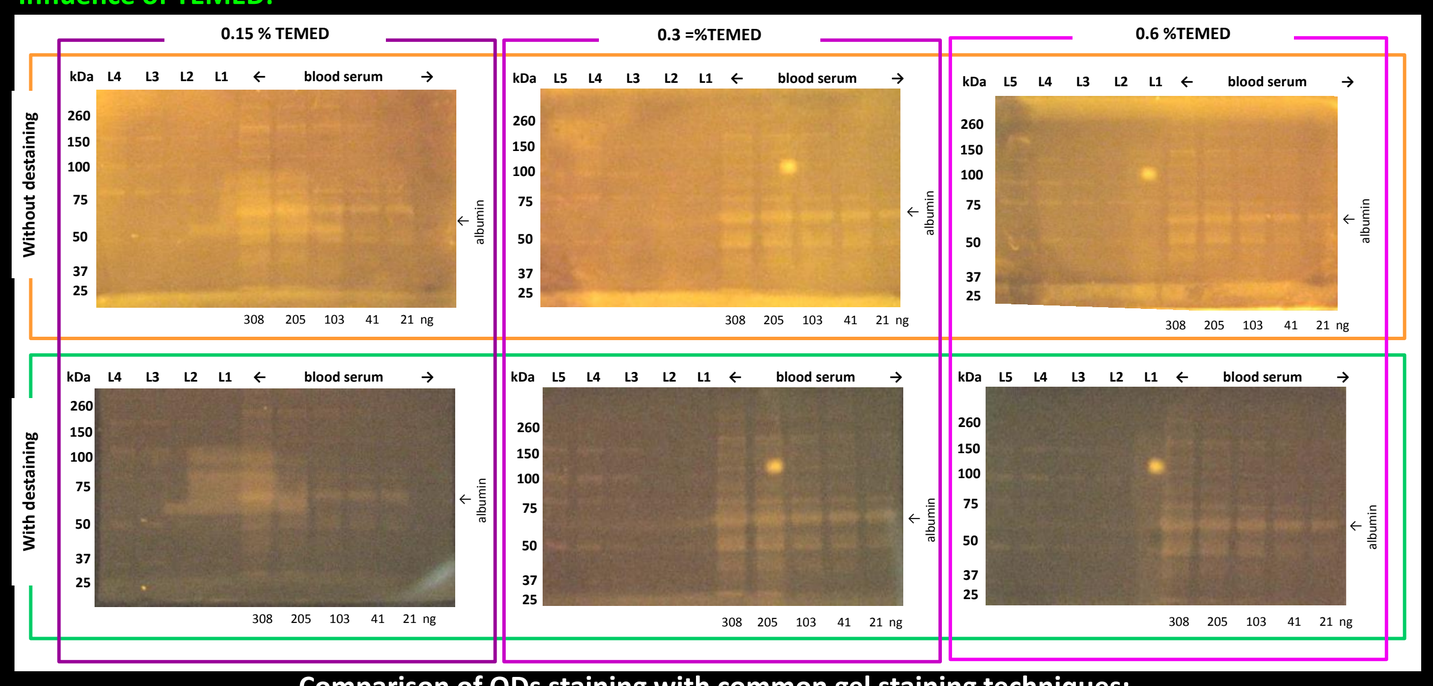
Results:

Fluorescence spectra of the prepared MPA-coated QDs:

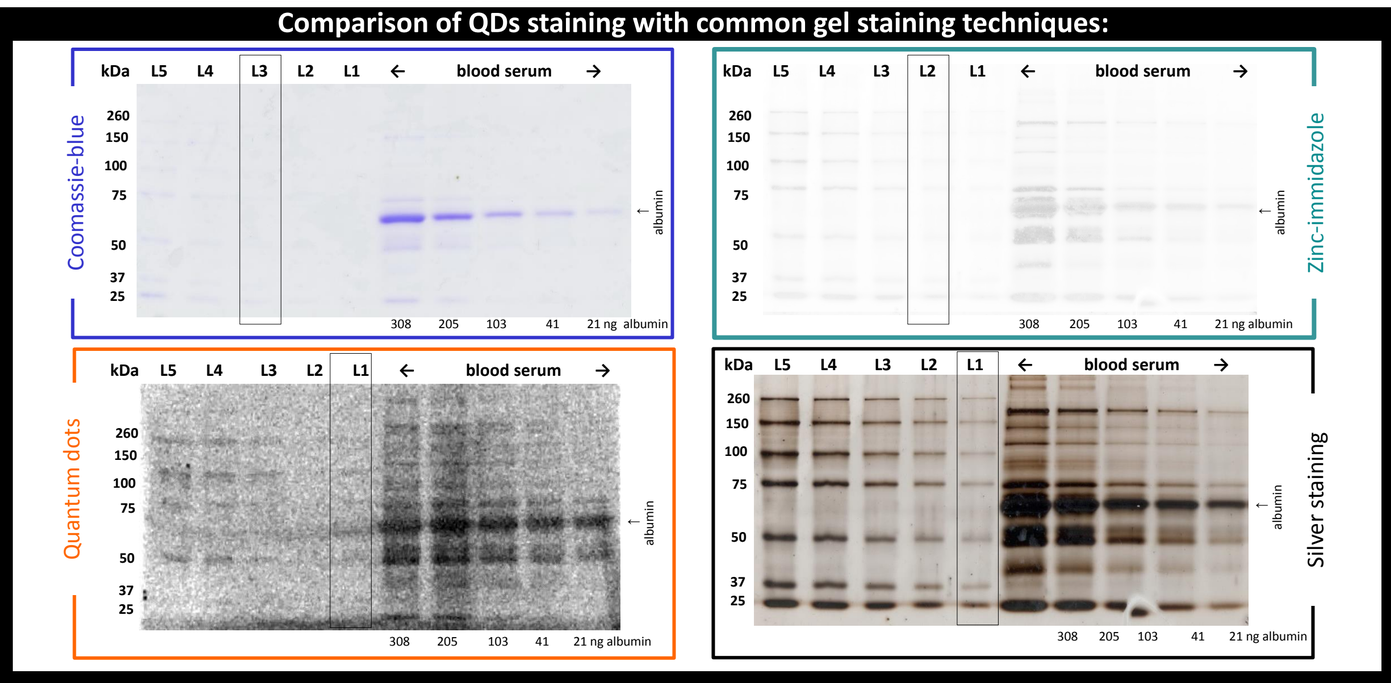




Influence of TEMED:



Comparison of QDs staining with common gel staining techniques:



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Conclusions:

- Utilizability of red and yellow fluorescent quantum dots for proteins staining in SDS-PAGE gels was tested.
- For this purpose yellow QD are more suitable than red because their lower size.

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