Fluophores

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Fluorophore

A fluorophore is a fluorescent chemical compound. It can re-emit light after its excitation by light.

The fluorophore re-emits light of a longer wavelength that the one that it absorbed. The fluorophore structure and its chemical environment influences the absorbed wavelenghts and the time before the emission, as well as the interaction of the molecule in its excited state with sorrounding molecules.

The excitation energies run from ultraviolet through the visible spectrum, and the emission energies may continue from visible light into the infrared region.

One of the most populars fluorophores that is used is the Flurescein. Its aplications goes from the antibody labeling to the nucleic acids. The most recent generations of fluorophores has been identified as more photostable, brighter and less pH-sensitive, what makes them perform better. Derivates of rhodamine, coumarin and cyanine are examples of other common fluorophores.

In medicine, as a tracer in fluids, as a probe or indicator or as a dye staining of certain structures (as a substrate of enzymes), the fluorophores are important for the diagnosis and the study of some health problems or reactions of our organism. This fluorescent chemical compounds are used to mark tissues and cells in various analytical methods, as in fluorescence imaging and spectroscopy. The process of fluorescent labeling is based on the attachement of fluorophores to another molecule, such as a protein or a nucleic acid.

Types of fluorophores

Organic dyes

The first fluorescence compounds used in biological research were the synthetic organic dyes, such as fluorescein.

This fluors of smaller size can be crosslinked to macromolecules, for example, antibodies, without any interference with their biological function, what is a benefit for bioconjugation strategies.

Biological fluorophores

Since the 1990s, when a biological fluorophore was used for the first time, many proteins have been projected to use in biological expression systems. Their use is now very common.

Quantum dots

This nanocrystals has unique chemical properties that provide control over the spectral characteristics of the fluor. When excited, they emit fluorescence at a wavelenght based on the size of the particle. Smaller quantum dots emit higher energy then the large one

Vantages and disvantages

The expression plasmids of the biological fluorophores can be introduced into bacterias, cells or organs to express that fluorophore, alone or fused to a protein of interest.

The appear of reactive oxygen species or some toxicity can be caused by the use of fluoresceint proteins. The normal biological function of the celular protein to wich the fluorophore is fused can be changed by the size of the biological fluorescente protein.

During the use of quantum dots they have been recognized has more photostable than other fluorophores. However, there are reports of response to the breakdown of the particles as cell toxicity.

Conclusion

Altought the disvantages of the use of this fluorescent chemical compounds, the vantages show that the fluorophores has an important place in the biological and medical research because they help to diagnose many health problems and they facilitate the study of many biological reactions that occur in our organism. This methods

have been in constant development and increasing owing to the versatility of the fluorophores and the thechniques are being improved for the melioration of the researches and the obtained results.

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