

Novel fluorescent Silica Nanoparticles for imaging applications.

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Fluorescent nanoparticles have been shown to overcome some of the limitations of fluorescent dye molecules in imaging applications such as photobleaching, pH-dependence of the fluorescent signal or limited intensity. The use of nanoparticles has been limited by toxicity effects of the used materials, by instabilities of the fluorescent signals and by the difficulty to conjugate such particles to antibodies or proteins. Active Motif Chromeon developed SiFluor nanoparticles showing a controlled size and shape and allowing flexible surface chemistry. ChromeoTM dyes are covalently bound inside the SiFluor core by a unique linkage molecule; this results in a uniform, reproducible distribution of hundreds of dye molecules each particle and prevents dye leakage. The fluorescent core is surrounded by a thin silica shell that is an effective barrier to the surrounding environment, minimizing photobleaching and photo-degradation. SiFluor nanoparticles show a strong continuous fluorescent signal without “on/off” phases or blinking and in combination with their photostability allowing their use in assays where high-intensity or long-term excitation are needed.

SiFluor particles' superior photochemical properties make them a versatile label for bio-imaging experiments. They are actively taken up by cells, do not show toxicity and can serve as cell label in living cells, especially if long-term staining is needed. Moreover, Active Motif Chromeon developed SiFluor particles that are covalently conjugated to the biotin-binding protein Streptavidin. These functionalized particles were tested in ELISA type assays as well as in immunohistochemistry applications. In comparison to fluorescent Streptavidin- or antibody-conjugates, the functionalized SiFluor particles reveal enhanced detection sensitivity. Thus, the collection of SiFluor-Streptavidin conjugates is a powerful tool to visualize biotinylated probes in fluorescence microscopy of live and fixed cells and in quantitative assays measured on a fluorescent reader.