**Ultrabright Fluorescent Nanoconstructs as Universal Enhancers**

**Technology Description**

Researchers have developed technology related to the composition and use of a novel combination of a plasmonic nanostructure, spacer layer, and fluorophores which results in a nanoconstruct which is spectrally similar to the fluorophores, but which is at least 500-fold brighter than the individual fluorophores alone. These ultrabright fluorescent nanoconstructs can be conjugated to at least one biorecognition element and used to enhance the performance of and improve the limits of detection of various biological assays and processes without changing or modifying existing bioassay protocols. Examples of assays that are suitable for use of these novel fluorescent nanoconstructs include, but are not limited to, antibody/protein microarrays, bead/suspension assays, biochip assays, capillary/sensor assays, cell assays, tissue assays, DNA/RNA microarrays, polymerase chain reaction (PCR)-based assays, glycan/lectin arrays, immunoassays, enzyme-linked immunosorbent assay (ELISA), microfluidic chips, and membrane-based assays.



**Stage of Research**

Researchers have tested the application of plasmonic-fluors as a fluorescence enhancer in fluorophore-linked immunosorbent assays (FLISAs) and a protein microarray and to enhance the SNR in flow cytometry-based cell analysis. They have used the fluorescent nanoconstructs to detect biomarkers related to kidney function and the results illustrate that the fluorescent nanoconstruct significantly enhances the ability to elucidate low-level kidney function parameters (biomarkers) to provide holistic kidney disease information.

**Applications**

The ultrabright fluorescent nanoconstructs, plasmonic-fluors (PF), can be used to enhance biological assays.

**Key Advantages**

* Plasmonic-fluors are solution phase which are much more useful than substrates decorated with plasmonic species
* Straightforward, wet chemistry synthesis - compared to things like alloyed Cu-Ag NPs, lithography created structures, or vapor deposition, or layer-by-layer synthesis
* Particle uniformity/stability/synthesis control is high which is crucial for immunoassays
* The spacer between the fluorophore and the plasmonic nanostructure core using MTPMS/APTMS/TMPS can be tightly controlled to achieve precise thicknesses on the nanometer scale and can be applied in solution
* The silane-based spacer layer is easily functionalized
* Improvement of assay performance is higher than previous methodologies
* Enhancement of fluorescence per dye molecule (on average) is higher than previously reported for arrangements which are suitable for immunoassay applications
* The larger particles used in the present disclosure can be loaded with more dye molecules than other designs - more dyes plus enhancement of all conjugated dyes equals super-bright construct