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Gold Multiplexing in Immunoassays

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Color multiplexing or simultaneous data readout without the need of spatial separation is a popular and convenient approach in current research. The opportunity to multiply the amount of analytes per sample by using a combination of dyes in molecular probes offers the potential to enhance scope and usability of conventional analytical techniques such as immunoassays. Gold nanorods can be conjugated to capture molecules like antibodies to form effective bioprobes. Their high extinction coefficients ensure a very high signal intensity and subsequently high sensitivities.

We here report on the generation, characterization and combinatorial use of gold nanoparticles including gold nanorods in multiplex assays. Their optical properties in the near infrared (NIR) range allow quantifiable signal separation due to sharp absorbance bands. The performance, signal separation and detection limit in multiplexing assays based on absorbance spectrometry is further improved by applying statistics to data processing and thus final readouts. The combination of various gold nanorods (3 and more) as multiplexing dyes with close spectral range (eg. 700-1200nm) and partial overlap is demonstrated offering an interesting alternative approach to conventional fluorescence tags making complex light and color filter setups expendable.