Development of a Toxic Metal Ion Sensor in Water Using Gold Nanoparticle-Amino Acid Assays

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The need for a facile, fast, and sensitive sensor remains as current methodologies to detect toxic heavy metal ions in drinking water require extensive laboratory equipment. In this project, we present the basis of simple, rapid, but sensitive colorimetric assay array for the detection of heavy metal ions such as lead and mercury in drinking water. The colorimetric assays are based upon the aggregation of gold nanoparticles in the presence of a heavy metal and various amino acids. The combinatorial response (i.e. the color changes of each assay) of the different assays allowed for naked-eye determination of which heavy metal is present in drinking water. Additionally, these sensor arrays proved to be extremely rapid as the color changes were found to occur within one minute, extremely advantageous over current detection systems. Overall, this study illustrates the viability of using the colorimetric properties of gold nanoparticles along with amino acids as a suitable detection system. Such a system can be extended to sense additional heavy metals as well as be used for on-field detection.

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