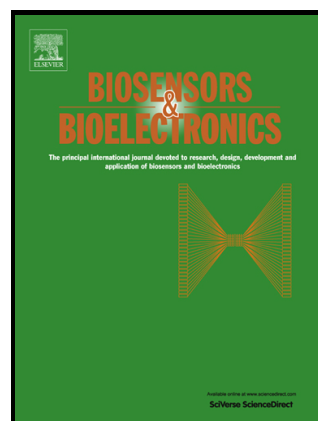


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# Synthesis of cadmium, lead and copper alginate nanobeads as immunosensing probes for the detection of AFP, CEA and PSA

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## Abstract

A double-water-in-oil-emulsion procedure was designed to synthesize cadmium, lead and copper alginate nanobeads less than 200 nm diameter under mild conditions. The cadmium, lead and copper alginate nanobeads can be activated to immobilize biomacromolecules and can directly produce distinctive electrochemical signals. Using the novel alginate nanobeads labeled with antibodies as electrochemical probes, a sandwich-type immunosensor was constructed using AFP, CEA and PSA as model analytes. This proposed immunosensor shows wide linear range with detection limits of 0.01, 0.0086 and 0.0075 ng mL<sup>-1</sup> for AFP, CEA and PSA, respectively. Analysis of clinical serum samples using this immunosensor was well consistent with the data determined by the enzyme-linked immunosorbent assay (ELISA). It suggested that the alginate nanobeads electrochemical probes could be generally extended to other multiple analytes detection.

**Keywords:** water-in-oil emulsion, cadmium alginate, lead alginate, copper alginate, immunosensor

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