Development of protein based Pb^{2+} biosensors

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Lead poisoning, due to the exposure to and uptake of this non-essential element, is the one of the most common health problems. Blood lead levels (BLLs), the level of the blood borne Pb^{2+} ion is used as a reliable measure of lead exposure. Development of low cost, sensitive, and selective method for BLLs detection has been a recent area of research. Towards this end, we propose to develop protein based Pb^{2+} biosensors. *Dezymer*, an automated design algorithm is used to predict $Pb(II)Cys_2His_2$ binding site into phosphate binding protein. Water soluble CdSe nanoparticles have been attached to the designed protein. This Pb^{2+} binding to this designed protein will change the protein conformation similar to maltose binding in maltose binding protein. The conformational change has been detected by altered Ru^{II} electron transfer to CdSe excited state. Changes in electron transfer efficiency lead to alterations in CdSe emission intensity. Pb^{2+} ion selective sensing device will be developed by attaching these protein-CdSe nanoparticles assemblies to fiber optics cables using silane derivitization chemistry. The progress towards the goal of development of Pb^{2+} biosensor will be discussed.