A Portable and Reusable Lead Detecting Device

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In many developing countries, daily consumption of water from polluted sources is the cause of thousands of deaths. Although natural sources of water contain certain elements which are safe and essential for the human body, an estimated of 143,000 deaths were the result of lead exposure worldwide. In particular, exposure to high concentrations of lead can lead to brain and kidney damage. Efficient methods for the detection of lead and other harmful heavy metals have been developed; however, these methods are expensive or non-portable. This study aims to develop of a low cost, portable electronic device that is capable of detecting high concentration of lead in water and provide real time updates to the user in order to prevent ingestion. Unlike other approaches, pairing graphene with Modified Multi-Walled Carbon Paste Nanotubes (MWCNT) allows us to effectively detect changes in lead concentrations due to their highly accurate and lead-selective properties. This process requires a potentiometric approach; the resistive element embedded in the sensor--composed of MWCNT--indicates an increase of lead ion concentration when the electric potential drops. The process of this detection is lead selective and can be mathematically calculated by using Ohm's law to display and notify the user. With the use of UHF RFID technology(ultra-high frequency radio frequency identification) and NFC (near field communication), the signal from the sensor is detected and sent to a device to be interpreted.