# Computationally Engineering a Single-Stranded Protein That Binds to Arsenic 3+ to Decontaminate Drinking Water

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An estimated 140 million people in at least 70 countries consume water with arsenic (As+3) levels above the guideline of 10 µg/L set by World Health Organization. Detrimental health effects of As+3 include it being a potent carcinogen, leading to skin, bladder, liver, and lung cancers. As+3 causes epidemiological toxicity; chronic exposure to As+3 can lead to arsenicosis, including skin lesions, blackfoot disease, and peripheral vascular disease. The current state-of-the-art methods include advanced membrane filtration techniques for removing As+3. However, they often face challenges of clogging, specificity in removal of As+3, and high energy and production costs. A promising alternative is the use of engineered proteins designed to selectively bind and eliminate As+3. This ecofriendly approach is advantageous because such proteins can be produced in living cells, enabling scalable production. In this project, we will use computational methods to engineer naturally occurring As-binding proteins to enhance their binding affinity, as well as develop newer ones that can improve binding to As+3.

**Awards Won:**