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Mousa Almousa mousa.almousa@und.edu

Yeo Howe Lim University of North Dakota, yeo.lim@und.edu

Olusegun Stanley Tomomewo University of North Dakota, olusegun.tomomewo@und.edu

Mahmut Ersan mahmut.ersan@und.edu

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Arsenate Removal from North Dakota Well Water: Titanium with MOF (UiO-66) Impregnated Carbon Blocks

North Dakota, Grand Forks, ND.

- MOF C TiO2 populations relying on private well water in North Dakota, USA, especially in American Indian communities. Organics use of private well water. The arsenic levels exceed the EPA's safety threshold of $10 \mu g/L$. Carbon block with Carbon block only Removes organics Amorphous UiO-66(Ti) Removes organics and carcinogenicity and is a top-priority hazardous and arsenic substance as it causes several health problems such as Fig 2: A schematic of the framework project liver, lung, kidney, and skin cancers. Our study aims to address this issue by investigating the effectiveness of the Materials and methods Point-of-use (POU) carbon block filter treatment systems. Synthesis of pristine MOFs with Ti precursor will be carried out using a modified solvothermal method Specifically, it will explore the potential of impregnating carbon blocks with amorphous titanium (hydr)oxide (THO) MOF (UiO-66) with NH-2 amino and titanium precursor will fabricated with MOF (UiO-66) (metal-organic framework) to be fabricated and synthesized with activated carbon in situ enhance arsenic removal from private well water without with heat treatment. introducing titanium (Ti) and MOF into the treated water. The mixture will be heated at 120 °C for 24 h, washed with Meaning American Indian, Alaska Native, Native Hawaiian, DMF and EtOH, and finally will be dried at 80 °C for 12 h to and Other Pacific Islanders obtain the Zr-MOF-Ti/AC sample % Population ZrCl4, TiO2, AC, DMF, Indigenous Alone H2BDC 80% or more 50% to 80% 35% to 50% 20% to 35% 10% to 20% 5% to 10% 2% to 5% Less than 2% In 2020, there were 4,447,431* Sonicated Americans with only Indigenous ancestry. Total: 1.3%*
- Introduction • Elevated exposure to arsenic disproportionately affects • They are at a higher risk of arsenic exposure due to their • Arsenic contamination is a global threat due to its toxicity

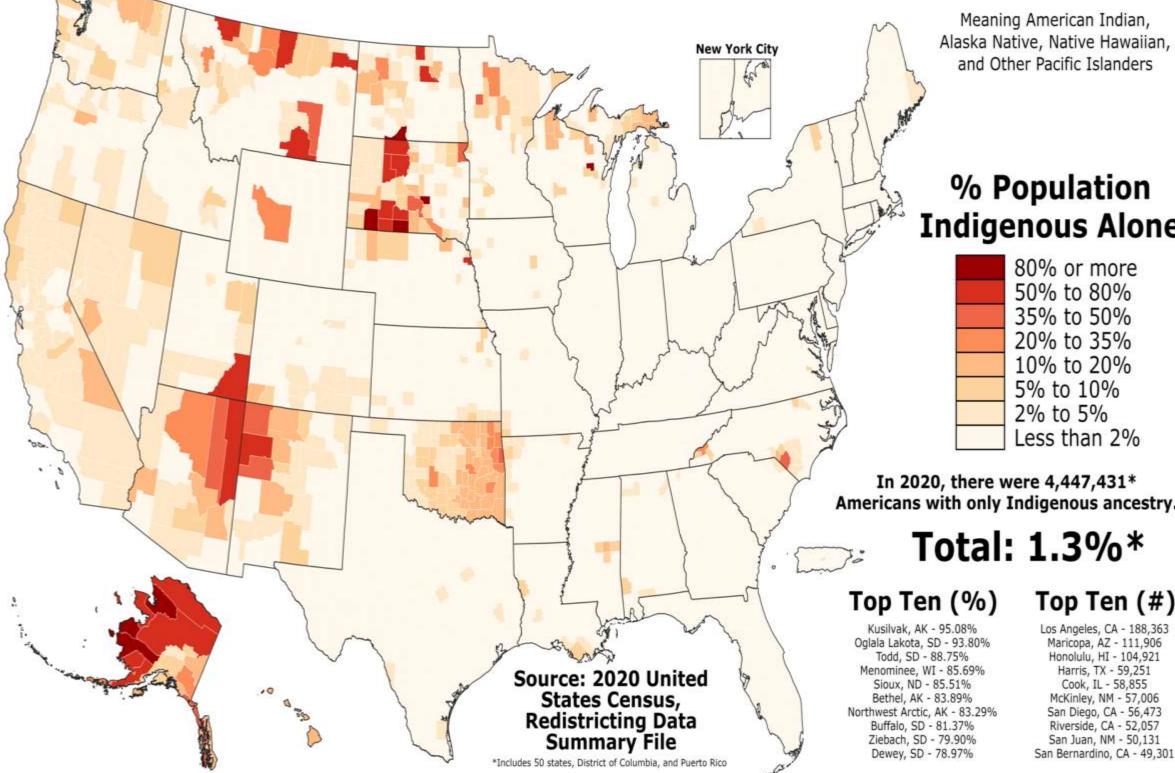


Fig1: The geographical locations of tribal nations across the United States, with a focus on North Dakota (ND).

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Fig3: In-situ synthesis of titanium with MOF accompanied by activated carbon impregnation



Mousa Almousa, Dr. Howe Lim, Dr. Olusegun Stanley Dr. Mahmut Ersan. Department of Civil and Petroleum, Engineering University of

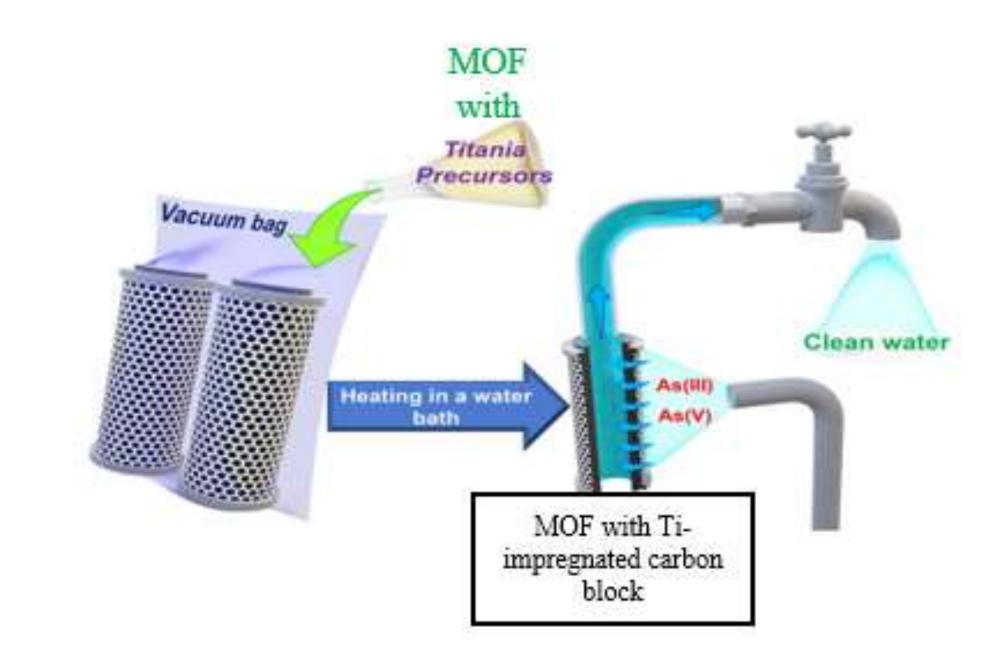


Fig 4: Point of Use (POU) treatment system

Conclusion

- Carbon block is the most widely used component in POU filters, but it cannot remove arsenic from water. Our objective is to enhance arsenic removal by impregnating these materials
- The porous structure of the AC provides a high surface area and facilitates the growth of well-defined MOF crystals, while the MOF coating on the AC particles enhances the adsorption capacity and selectivity of the composite material.
- This sustainable disposal of produced water may encourage the recycling and reuse practice, ultimately reducing the use of freshwater for hydraulic fracturing.
- The POU system provides a valuable solution for addressing water quality challenges at the household and community levels

Refernces

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- 2. Solis, Kurt Louis B., Young-Hwan Kwon, Moon-Hyeon Kim, Ha-Rim An, Cheolho Jeon, and Yongseok Hong. "Metal organic framework UiO-66 and activated carbon composite sorbent for the concurrent adsorption of cationic and anionic metals." Chemosphere 238 (2020): 124656.
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