New Method to Reduce Contaminants from Water Leveraging High Surface Area 3D printed Structures Published

Impact Statement: This work funded by the Dredging Operations Environmental Research Program (DOER) provides methods and performance demonstration to remove contaminants such as ammonia from dewatered sediments using highly adsorptive 3D printed structures. The novel methods provide a user friendly way to tune higher surface area from 3D printed structures using inexpensive desktop 3D printers. This work can be leveraged into on-site on-demand production of personal portable drinking water treatment and other water security applications.

Traditional contaminants in dredged sediments such as ammonia can leach into the water during informative laboratory evaluations simulating disposal operations or confined disposal facility discharges and cause load restrictions to meet statutory requirements such as federal and state water quality criteria or standards that in practice do not allow the largest and most cost effective dredges. This innovative research provides an easy to execute method to print structures that can adsorb contaminants that move from dredged sediment into the water. The work is published in the journal *Additive Manufacturing* (impact factor 10.3) by Alan Kennedy, Chris Griggs and Lauren May (all ERDC-EL), Travis Thornell (ERDC-GSL) and collaborators from Virginia Tech. The work showed how changing the printing settings results in high porosity structures with both physical and rheological explanations. Kinetic models indicated the rate of water contaminant reductions, correlated to both printed porosity, and provided direct evidence that the 3D printed materials outperformed traditional injection molding approaches to make composite materials.

The journal article is available at the following links:
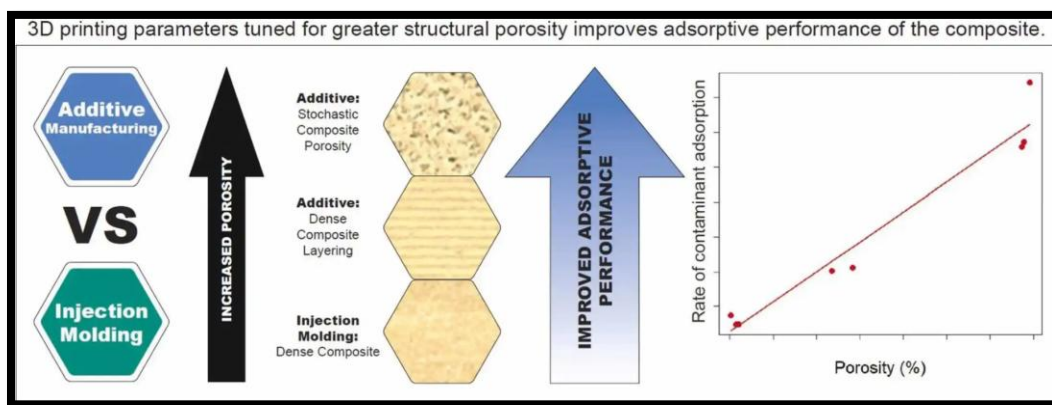- permanent link: https://www.sciencedirect.com/science/article/pii/S2214860425001265
- free link (30 days): https://authors.elsevier.com/c/1ktMR7tcTWs-an

Figure 1. Infographic summarizing that higher surface area 3D printed structures remove more contaminant faster.

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