# Article information:

Stabilization of Dredged Sediment Using Activated Binary Cement Incorporating Nanoparticles | Journal of Materials in Civil Engineering | Vol 34, No 1
<https://ascelibrary.org/doi/full/10.1061/%28ASCE%29MT.1943-5533.0004017>

# Article summary:

1. The study investigated the use of activated binary cement (BC) incorporating nanoparticles as a potential alternative to Portland cement for stabilizing dredged sediment (DS).

2. Chemical activation with Na2SiO3, Ca(OH)2, and Na2SO4 was found to effectively improve the unconfined compressive strength (UCS) of BC-stabilized DS, with composite activators SM/SS exhibiting more advantages than single activators.

3. Nanomodification with nano-SiO2 and nano-MgO further improved the UCS of SM/SS-BCDS, with composite nanoparticles NS/NM being more effective than single nanoparticles in improving strength gaining. The findings provide an eco-friendly and efficient binder for DS stabilization.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article titled "Stabilization of Dredged Sediment Using Activated Binary Cement Incorporating Nanoparticles" presents a study on the use of portland cement (PC)–ground-granulated blast-furnace slag (GGBS) binary cement (BC), which was improved by chemical activation and nanomodification, as a potential alternative to PC for stabilization of dredged sediment (DS). The article provides detailed information on the materials and methods used in the study, including the mix design, sample preparation process, and testing methods.

The article presents several key findings, including that chemical activation can effectively improve the UCS of BCDS, and optimum single activator contents of SM, CH, and SS were respectively 6%, 4%, and 10%. Composite activators SM/SS with mass ratio of 1/9 exhibited more advantages than a single activator. Nanomodification can further improve the UCS of SM/SS-BCDS. The optimum single nanoparticle contents of NS and NM for SM/SS-BCDS were 6% and 8%, respectively. Compared with a single nanoparticle, composite nanoparticles NS/NM with mass ratio of 5/5 were more effective in improving UCS of SM/SS-BCDS. The 15% optimum NS/NM-SM/SS-BC can be used to replace 30% PC for DS stabilization.

While the article provides valuable insights into the potential use of nanomodified and activated BC binder in DS stabilization as a substitute to PC, there are some potential biases and limitations to consider. For example, the study only focuses on one type of DS from a specific location in China, which may not be representative of all types of DS found globally. Additionally, while the article notes that PC production has various environmental costs such as greenhouse gas emissions and consumption of nonrenewable resources, it does not provide an in-depth analysis or comparison between PC and GGBS in terms of their environmental impact.

Furthermore, while the article presents several key findings related to the effectiveness of chemical activation and nanomodification in improving UCS for BCDS samples, it does not explore any potential risks or drawbacks associated with these techniques. Additionally, while the article notes that composite activators SM/SS with mass ratio of 1/9 exhibited more advantages than a single activator, it does not provide any explanation or evidence for why this is the case.

Overall, while this article provides valuable insights into using nanomodified and activated BC binder for DS stabilization as an alternative to PC, there are some limitations to consider regarding its generalizability and potential biases. Further research is needed to fully understand the effectiveness and

# Topics for further research:

* Environmental impact of portland cement production
* Types of dredged sediment found globally
* Risks and drawbacks of chemical activation and nanomodification in cement
* Comparison of GGBS and PC in terms of sustainability and cost-effectiveness
* Long-term durability of stabilized dredged sediment using activated binary cement
* Potential applications of nanomodified cement in other construction materials and industries.

# Report location:

<https://www.fullpicture.app/item/e9a1d48888ac4a31ed3d119ec1cb8fce>