

Advanced geo-materials for environmental geotechnical engineering in China

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Abstract: Bai Bing was born in October 1966. He is currently a professor and doctoral supervisor at the Beijing Jiaotong University, Beijing, China. He has published more than 180 academic papers in international academic journals and edited 10 academic monographs and textbooks. He was awarded the Beijing Natural Science Award (2023), and the Natural Science Prize of the Ministry of Education of the People's Republic of China (2022) for his outstanding scientific research as a first-completion recipient. He has been named to Stanford University's career/singleyr List of the "World's Top 2% Scientists" for three consecutive years. He serves as an editorial board member of the Journal of Geotechnical Engineering and Rock and Soil Mechanics of China. His main research fields include advanced geo-material, granular thermodynamics, thermal consolidation theory, contaminant transport theory. In recent years, he has devoted himself to the research progress of geo-material science, soil pollution and geotechnical environment. He prepared advanced cementitious materials from solid waste red mud, and obtained high-performance red mud base geopolymers through alkali-thermal activation and optimization of ratio, which not only have high strength, but also have good corrosion resistance and frost resistance. At the same time, the red mud-based materials have good solidification effect on toxic heavy metals, and the red mud-based geopolymer has the possibility of replacing cement. In addition, he proposed the idea of particle thermodynamics to describe the physico-mechanical characteristics of geotechnical materials and developed advanced geotechnical materials to address environmental pollution, control technology and related issues. He developed a theory describing the cotransport of heavy metals and suspended particles at different temperatures in porous media and proposed a nonlinear attachment–detachment model with hysteresis suitable for substances with sizes ranging from ions to large particles, which is a new scientific discovery in the field of hydrology.

Keywords: Bai Bing, professor, advanced geo-material, granular thermodynamics, thermal consolidation

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Acknowledgement: This research was funded by the National Natural Science Foundation of China (52378321; 52079003).