



DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

High-Performance Materials for Resilient Coastal Infrastructure: Challenges and Opportunities

Prof. Ruben Paul Borg
University of Malta, Malta

Date: August 6, 2026 (Thursday)

Time: 10:00 a.m. – 11:00 a.m.

Venue: Room 633, 6/F Haking Wong Building, The University of Hong Kong

Abstract

Coastal infrastructure plays a vital role in supporting economic development, transportation, tourism, and the protection of coastal communities at the global scale. However, increasing pressures from climate change, including sea-level rise, extreme weather events, and the aggressive marine environment are accelerating the deterioration of coastal assets and challenging traditional engineering practices. Addressing these issues requires not only resilient design strategies but also the adoption of high-performance materials capable of delivering enhanced durability, structural reliability, and long-term sustainability. This presentation explores the opportunities offered by recent advances in high-performance construction materials, including ultra-high-performance concrete (UHPC), fibre-reinforced cementitious composites, corrosion-resistance, geopolymer binders, and advanced repair materials. These innovations provide improved resistance to chloride penetration and corrosion, and other actions on infrastructure, significantly extending the service life of coastal structures while reducing maintenance requirements and life-cycle costs. The presentation also considers the growing role of digital technologies, structural health monitoring, and performance-based design in supporting resilient coastal infrastructure. Furthermore, the lecture examines the technical, economic, and environmental challenges associated with implementing these materials at scale. These include higher initial costs, material standardisation, constructability, long-term performance validation, and the need to balance resilience with sustainability and carbon reduction objectives. The lecture concludes by outlining future research priorities and practical pathways for developing coastal infrastructure that is durable, sustainable, and resilient in the face of an increasingly uncertain climate.

About the Speaker

Professor Ruben Paul Borg is a Full Professor at the University of Malta, and the Director of the Climate Action Authority in Malta. His main research is in Materials Science and Engineering, Cement based materials, recycling of waste and industrial by-products, Reinforced Concrete Structures, Civil and Structural Engineering, Durability assessment and repair of structures and Industrial Heritage. Prof Borg was the Principal Investigator of many Research Projects including the Horizon 2020 ReSHEALience Ultra High Durability Concrete, Horizon Europe SINCERE Renovation of Cultural Heritage. Prof. Borg is active in structural and civil engineering and led various engineering design and construction projects including the Sustainable Development Centre (Malta), which was awarded the International Energy Globe Award 2013; the Reinforced Concrete Water Tower awarded the Prix d'Honneur in Restoration & Judge CCurren Award, and International Energy Globe Award in 2022; the Wildlife Rehabilitation Centre and Nature Park awarded the Prox d'Honneur in Restoration by Din l-Art Helwa and the International Energy Globe Award in 2024; the Sustainable Development Award in R&D in 2025.

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