

A Review on Tin Slag Polymer Concrete as Green Structural Material for Sustainable Future



M. S. Manda, M. R. M. Rejab, Shukur Abu Hassan, and Ma Quanjin

Abstract Ordinary Portland cement concrete (OPC) is widely utilized in construction industry as structural material, but it has environmental issue due to natural resources consumption and Carbon emission. Therefore, polymer concrete (PC) with tin slag (TS) waste are introduced to replace aggregate and cement in OPC. Previous research on potential to apply TSPC as structural material has provided compressive strength data which shows that it can compete with OPC. PC using polyester and 100% TS aggregate with resin-aggregate ratio 30:70 consist of fine (<1 mm) uniformly graded aggregate has achieved compressive strength 58.21 MPa. After that, in another study, gap graded performance of TSPC using raw (4 mm) and coarse (2 mm) TS aggregate introduced and result in compressive strength 37.71 MPa, highest compared to other variation. By applying external FRP strengthening with two layers of CFRP increase strength to 125.07 MPa and finally uniformly graded TSPC with three layers of CFRP wrapping increased strength to 156.88 MPa. This discovery has contributed to the beginning of active study in TSPC as green structural material for sustainable future.

Keywords Green · Structural Material · Polymer Concrete · Tin Slag · Compressive Strength · FRP Confinement · TSPC · Sustainable

M. S. Manda
Politeknik Sultan Haji Ahmad Shah, Kuantan, Pahang, Malaysia

M. S. Manda · M. R. M. Rejab (✉) · M. Quanjin
Structural Performance Material Engineering (SUPREME), Faculty of Mechanical & Automotive Engineering Technology, Universiti Malaysia Pahang, Pekan, Pahang, Malaysia
e-mail: ruzaimi@ump.edu.my

M. Quanjin
e-mail: neromaquanjin@gmail.com

S. A. Hassan
Centre for Composites, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia
e-mail: shukur@utm.my

M. R. M. Rejab
School of Mechanical Engineering, Ningxia University, Ningxia, China