TEXAS A&M UNIVERSITY CORPUS CHRISTI | COASTAL BEND MIDSTREAM PROGRAM

AMSI Targets Midstream Construction

Electrically conductive concrete is a transformative innovation, significantly enhancing efficiency, safety, and sustainability – critical for pipeline and offshore infrastructure. Dr. Nancy Soliman's Advanced Materials for Sustainable Infrastructure (AMSI) Laboratory at Texas A&M University–Corpus Christi is actively leading focused research and development efforts in conductive concrete.

At AMSI Lab, multifunctional conductive materials with enhanced strength have been developed by strategically incorporating conductive fillers such as nano-carbon black (nCB) and steel fibers into cement-based matrices. This approach creates a robust multiscale conductive volumetric wiring network at low filler dosage (~1.5% nCB combined with 1% steel fibers), effectively optimizing high electrical conductivity and mechanical performance simultaneously.

This innovative conductive concrete presents promising practical applications tailored specifically to the pipeline and offshore industries. It enables Joule-effect self-heating for pavements and pipeline encasements, mitigating ice formation and reducing maintenance costs in cold climates. It also facilitates real-time structural health monitoring, rapidly identifying weaknesses in pipeline supports or offshore structures, significantly improving safety and reliability.

Additionally, it provides effective cathodic protection against corrosion, extending infrastructure lifespan. Potential applications also include electromagnetic interference (EMI) shielding and energy harvesting – positioning AMSI Lab to collaborate with industry partners to tackle real-world infrastructure challenges.