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Proposal Title: Morphological and Nanomechanical Analyses of Ground Tire Rubber Modified Asphalts

Principal Investigator: Zahid Hossain
College of Engineering
Department: Civil Engineering
Morphological and Nanomechanical Analyses of
Ground Tire Rubber Modified Asphalts

Over 5.2 million tons of scrapped tires are produced each year in the United States. Disposal of this huge amount of scrapped tires has become a serious environmental issue. In recent years, scopes to use scrapped tire in the form of Ground Tire Rubber (GTR) in road construction projects have been analyzed as GTR has potential to improve asphalt's performance from stiffness, resilience and shock absorbance perspectives. In this study, the PeakForce Quantitative Nanomechanical Mapping (PFQNM™) mode of an atomic force microscope (AFM) has been employed to analyze mechanistic properties and morphology of GTR-modified binders. A performance grade (PG 64-22) binder modified with two different grades (Mesh #30 and Mesh #40) of GTRs has been analyzed in this study. Nanomechanical properties such as adhesion, and DMT (Derjaguin, Muller, and Toporov) modulus for each blend have been quantified. Each sample was scanned at three different areas. Two distinct phases, namely, Catana and Peri-phase, were observed in GTR-modified samples, although the DMT moduli were found to be in a close range. It was observed that modification of asphalt by GTR considerably changes the mechanistic properties of the base binder.