Case #586

Environmentally Responsive Fibers for Reinforced Concrete Composites

Fiber-reinforced concrete composites have become popular in the construction industry due to their robust nature with regard to both compression and tension. These fibers, however, cannot be prestressed or post-tensioned in any practical way with the current standard of technology.

Professors Lee, Huston and Tan have invented a method of efficiently prestressing a reinforced concrete composite using environmentally responsive (ER) fibers. Having the fibers prestressed upon the curing of the concrete allows them to apply a restoring compressive force before the structure experiences any tension, allowing the structure to apply even stronger forces in opposition to any tension it experiences. The inventors' method of pre-stressing takes advantage of a number of environmental changes that occur during the cement curing process, including the pH, moisture and temperature of the concrete medium during curing. In addition, construction by melt electrospinning, allows the ER fibers to be oriented randomly, such that the structure can resist tension and torsion forces from many directions.

Applications:

- Load-bearing concrete structures such as garages.
- Porous pavements, which currently suffer from low durability.
- Asphalt pavement structures.

Advantages:

- The randomness of the orientation of the ER fibers allows the concrete structure to handle a much more diverse array of stresses than the current standard of reinforced concrete.
- Can be applied as a replacement for steel bar reinforcement or in addition to it.

Intellectual Property and Development Status:

US Non-Provisional Application 15/569,655
Looking for research and development partners and licensing opportunities.

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