

Coal Core Composites for Low Cost, Light Weight, Fire Resistant Panels and Roofing Materials



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Purpose

To provide for new uses of coal in a profitable, environmentally benign manner.

Need

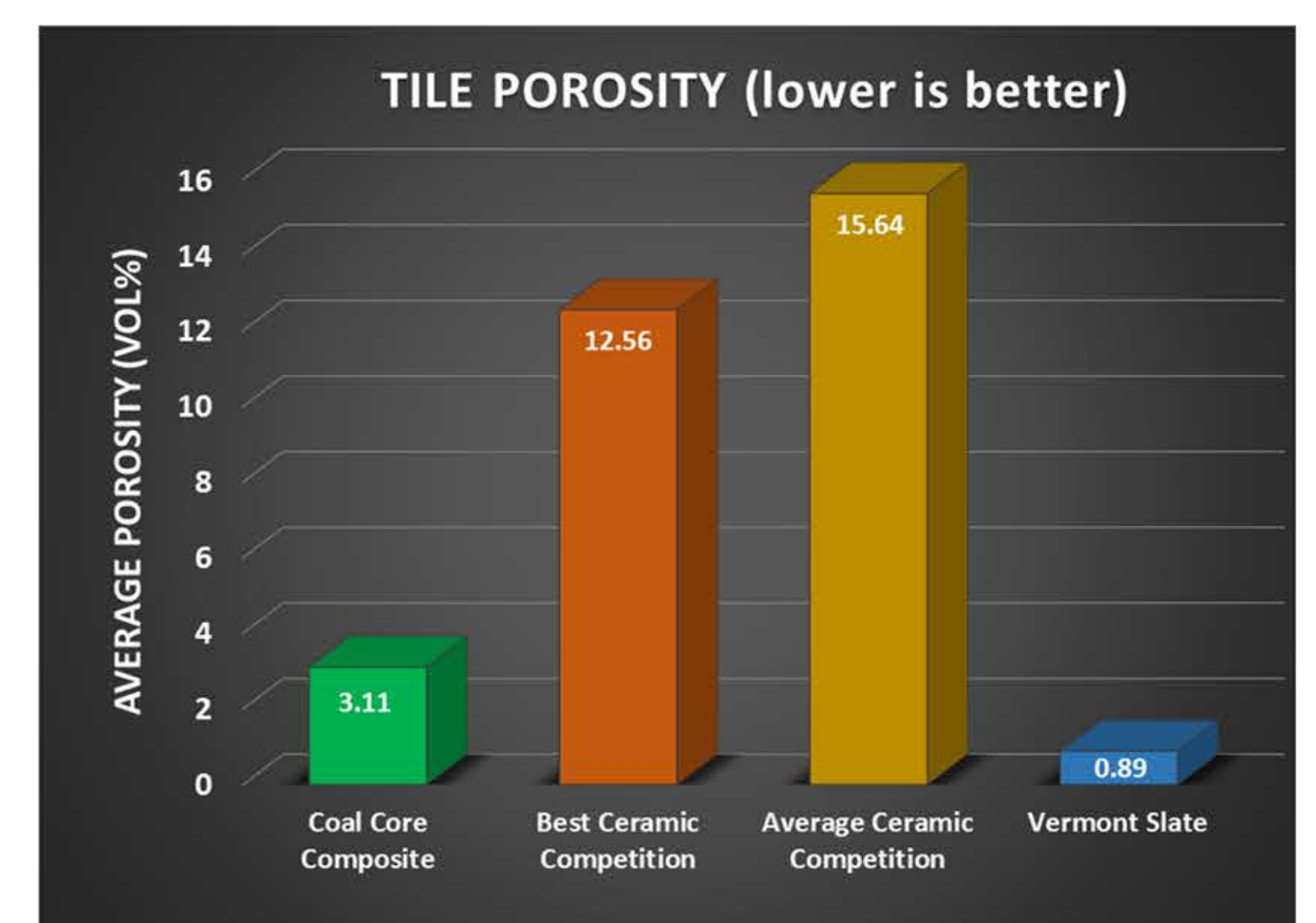
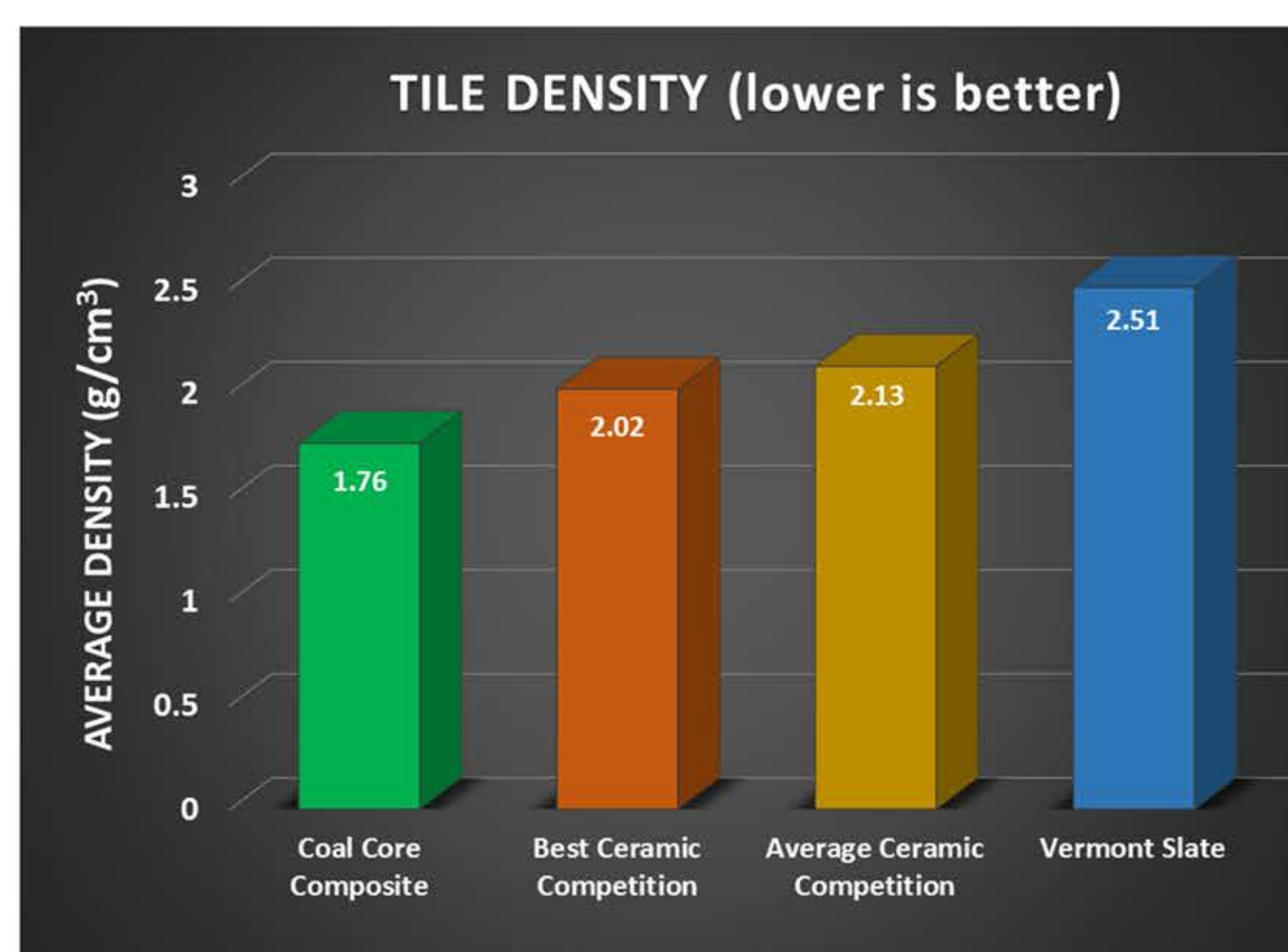
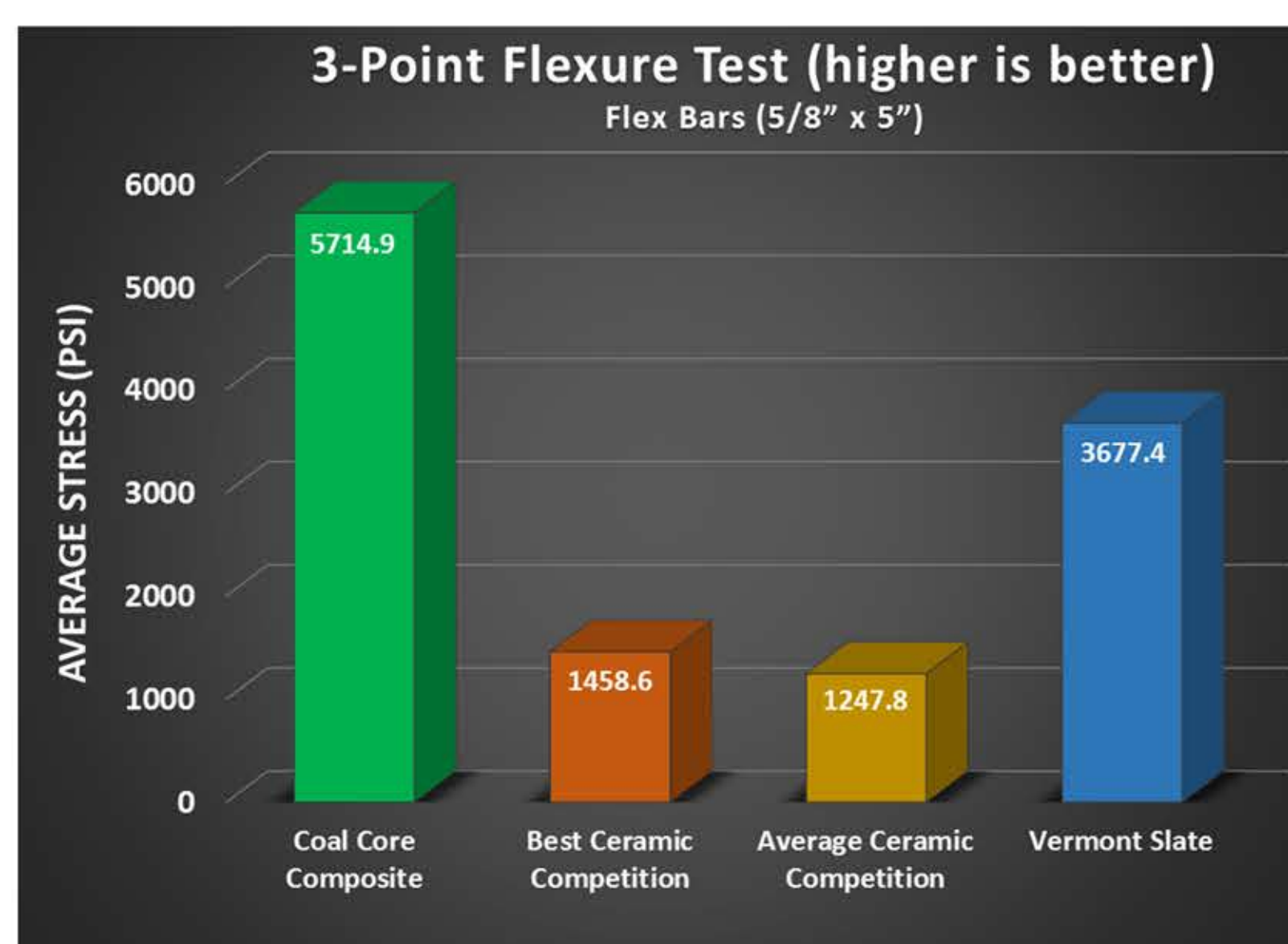
Modern roofing systems require lightweight, low-cost, fire-resistant materials. This work seeks to use Coal Core Composites in an environmentally friendly way to address the need.

Approach

- Combine coal particles with X-MAT® Polymer-Derived Ceramics to create a new class of materials - Coal Core Composites.
- Perform initial R&D activities to produce roof tile materials leading to a viable product.
- Compare Coal Core Composite roof tiles to commercially available ceramic and slate tiles through in-house and industry-standard testing.

Results

Initial Mechanical Testing: Coal Core Composite (shown in green below) was compared to ceramic roof tiles, asphalt shingles, and slate tiles.



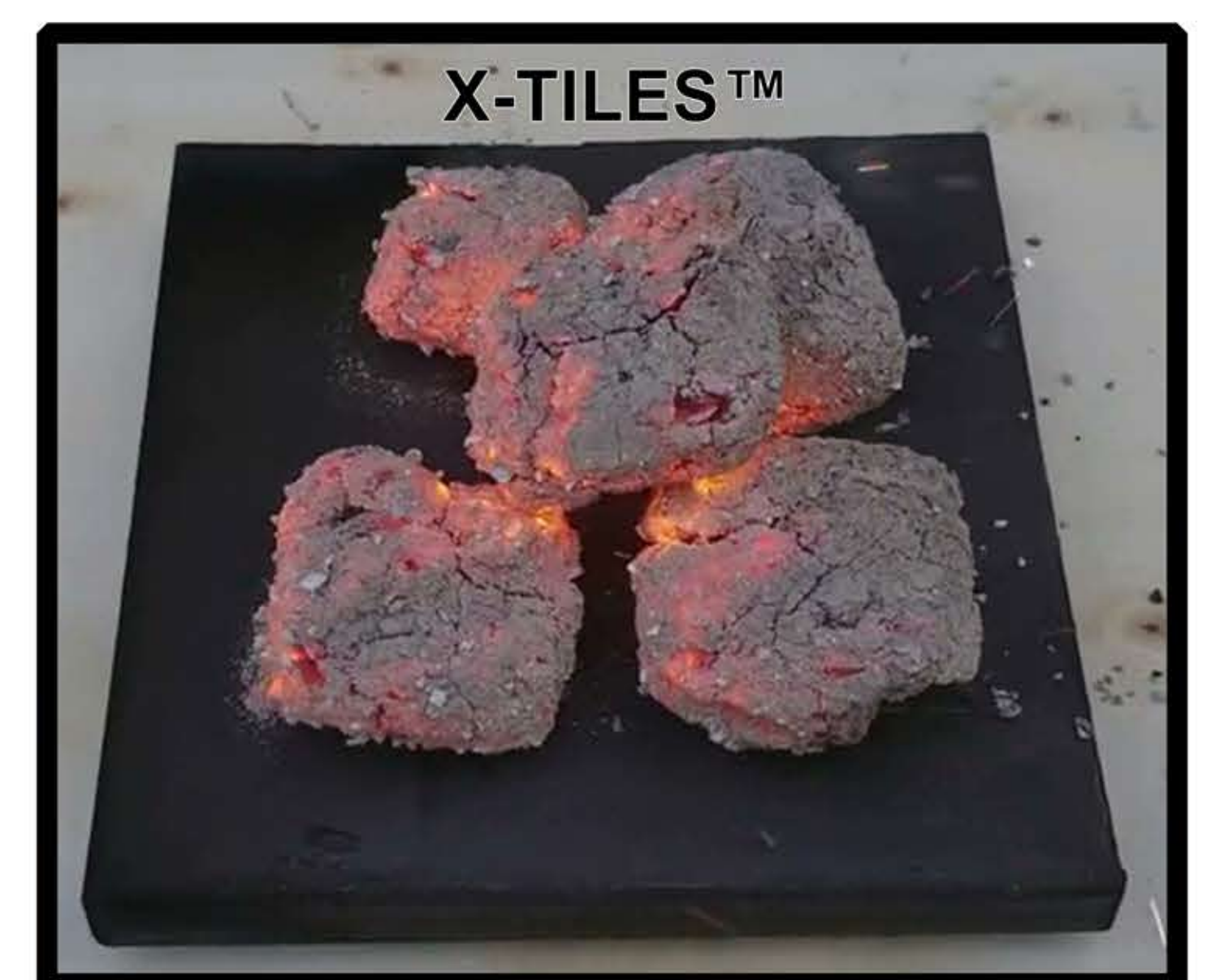
Flame Test:
Despite being made of coal, Coal Core Composite does not burn!



Burns after 1 minute.



Cracks after 1.5 minutes.



Does not burn or crack after 2.5 minutes

Additional Mechanical Testing:

- Passed Miami-Dade County modified version of ASTM 1167.
- Passed 30-cycle 24-hour freeze/thaw test.
- Exceeded all ceramic tiles in modified ball drop test.

Benefits

- Find an alternative path to use coal as a value-added product.
- Plans are to build a manufacturing plant in Appalachia near coal source for a positive economic benefit.
- Carbon in coal is sequestered in this approach so the environmental impact is benign.

Future Work

- Address variability and consistency of the Coal Core Composite process.
- Focus on a high-end path to replace slate and lower cost path to replace standard ceramic tiles.
- Scale the process to attain economic viability.



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