Docket #: S24-366

Phlego: Geomimetic Cement - Composition Methods

Stanford researchers have developed an approach to enhance Phlego cement production by leveraging the Streckeisen (QAPF) diagram, a powerful tool for classifying igneous rocks based on their mineralogical composition.

The construction industry faces significant challenges in sourcing materials that meet specific performance criteria while also being environmentally sustainable. Traditional cement production often relies on limited geological resources, leading to inconsistent material properties and increased environmental impact due to transportation and extraction processes.

This method addresses these challenges by employing a strategic "mix and match" technique that allows for the blending of surrounding rock compositions to achieve a desired target profile. By utilizing the inherent variability of local geological materials, this approach not only results in customized material properties that exceed the capabilities of traditional carbonate rocks but also optimizes resource utilization. The flexibility of this strategy ensures that cement compositions can be adjusted to maintain optimal performance under varying environmental conditions.

This method represents a significant advancement in sustainable construction practices, offering a pathway to produce high-quality, tailored cement blends that meet the dynamic needs of modern infrastructure.

Applications

- Tailored cement, cementitious materials, and supplementary cementitious materials
- Adaptive material solutions: ability to recalibrate cement compositions for varying environmental conditions, ensuring consistent performance over time.

Advantages

- Resource efficiency: optimize the use of local materials, reducing reliance on distant geological sources.
- Cost-effective production: lower production costs through reduced transportation and material sourcing expenses.
- Environmental sustainability: minimize carbon footprint by utilizing locally available resources and reducing waste in cement production.
- Performance consistency: maintain high performance standards across diverse environmental conditions, ensuring reliability in construction applications.

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