CeramicAsh: Material and Method

Tech ID: 23070 / UC Case 2012-114-0

SUMMARY

Researchers at UCLA have developed a method for reducing the manufacturing costs associated with chemically bonded ceramics.

BACKGROUND

The manufacturing process for cement and other high strength ceramics typically requires high temperature sintering that becomes costly at high volumes. Portland cement uses chemical bonding in order to avoid the costs associated with high temperature sintering, but other downstream processing conditions still render it expensive and its mechanical properties are still inferior to sintered ceramics. Chemically bonded ceramics (CBCs) attempt to bridge the gap between material properties and manufacturing costs. CBCs are high mechanical strength and corrosion resistance materials that avoid high temperature sintering through a fast, room temperature chemical bonding manufacturing process.

INNOVATION

Dr. Jenn-Ming Yang and colleagues in the UCLA Department of Materials Science and Engineering have developed a method for reducing the manufacturing costs of CBCs through the development of CeramicAsh^{TM}. By using fly ash, a waste product produced at coal burning power plants, CeramicAsh^{TM} boasts a compressive strength of roughly double that of Portland cement at a fraction of the weight. The inventors have also demonstrated that the material's density, transparency, and pH can be tailored to produce specific solutions. Such versatility allows for a myriad of potential applications for this inexpensive yet robust new material.

APPLICATIONS

- Fire resistant coating for wood and other materials
- Replacement for gypsum in building materials
- Nuclear waste storage
- High temperature resistant paint
- Semitransparent porous glass applications, with different colors available
- Aerospace material
- Integration into composite capacitors
- Synthetic bone tissue and dental implants

ADVANTAGES

- Low manufacturing costs
- Raw material comes from fly ash, an abundant waste product
- Chemically bonded ceramics avoid costly high temperature sintering
- Reduces environmental impact of industrial manufacturing
- Several parameters can be adjusted
- Setting time – permits use as paint
- pH - permits reinforcement with inexpensive E-glass fibers
- Density – can be made extremely low when weight is a concern
- Color and opacity
- Compressive strength of 40 MPa is expected

CONTACT

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Materials, ceramics, waste, Cleantech, Cement, Concrete, CBC, Ash

CATEGORIZED AS

- **Environment**
  - Remediation
- **Materials & Chemicals**
  - Ceramics
  - Composites
- **Nanotechnology**
  - Materials

RELATED CASES

2012-114-0

STATE OF DEVELOPMENT

Researchers have produced CeramicAsh^{TM} using their methods, and have demonstrated the various mechanical properties listed. Currently, the inventors are testing CeramicAsh^{TM} fabrication at industrial levels, and experimenting with different reinforcing materials to confer additional useful properties.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,911,548	12/16/2014	2012-114

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