

Novel Transparent Dilatant Materials Comprised of Single Chemical Component

Background

Dilatant materials are non-Newtonian, shear thickening fluids whose shear viscosity increases with shear stress. Since these materials harden on sudden impact, they have shown great promise for use in a variety of areas, ranging from personal protective equipment and body armor to vehicular traction control and protective cases for portable electronics. However, few such materials exist, which limits their use. In addition, controlling the transparency of dilatant materials has proven to be difficult due to the two-phase nature of most shear thickening fluids and this has to date limited their use in areas such as armored glass or auto windshields.

Technology

Research from the University of Wisconsin-Stevens Point has resulted in the synthesis of a series of materials exhibiting a range of dilatant properties. The materials show good transparency and are chemically uniform (e.g. consisting of a single chemical component).

The degree of dilatancy is easily controlled by adjusting the compositions of the materials. Due to the range of dilatant properties, good transparency, and single chemical component nature of the dilatant samples, these materials show significant promise for novel uses in protective equipment and other areas related to impact protection, especially where transparency is desirable.



Transparent dilatant sample

Research and Development Status

Laboratory-scale synthesis and preliminary characterization of dilatancy has been achieved. The degree of dilatancy is dependent on the composition of the materials. Quantitative determinations of non-newtonian properties have not yet been completed although qualitative observations are notable. WiSys is seeking a strategic partner in material science or the protective equipment industry who is interested in furthering the development of these novel dilatant materials, ultimately providing a path to market for their use.

Commercial Applications & Key Technical Features

T170056 provides for a platform technology with utility across a broad range of applications related to impact protection and shock absorption (e.g. Sports protective equipment; Body armor; Protective and automotive glass; Portable electronics protection and traction control in vehicles and machinery).

Key performance features of the materials include:

- Material displays dilatant properties;
- Degree of dilatancy can be modified by adjusting the monomer composition;
- Transparency is easily controlled;
- Excellent adhesive properties suitable for layered glass applications.

Intellectual Property

A U.S. provisional patent application has been filed for this invention. For more information on partnering opportunities, please contact Jennifer Cook at jennifer@wisys.org or by phone at 608-316-4131.