Lightweight Porous Materials Using Capillary Foam (#6439)

Highly networked liquid foam structures using water, air, oil and colloidal particles

Inventors at Georgia Tech have developed highly networked liquid foam structures using water, air, a water-immiscible solvent (oil), and colloidal particles. Standard frothing technologies can be applied to manufacture the foam. Many different types of oils (including standard solvents such as alkanes or silicone oil, and monomers such as trimethylolpropane trimethacrylate, TMPTMA) and many different types of particles (including polyvinyl chloride, polyethylene, polyvinylidene fluoride, silica, and cellulosic particles) can be used. It is even possible to make the entire foam biocompatible, biodegradable, or edible, and additional processing allows to tune the thermal and electric conductivity. Dyes optionally added to the oil phase can impart intense and uniform coloration to the foam that is not achievable with standard foams. Solid foams can be obtained by drying, and the choice of curable oils or incorporation of reactive components offer further options for reinforcement.

Benefits/Advantages

- Easily attainable and economically feasible raw materials- water is used as the primary bulk fluid and air is used as the bubble gas
- Ability to alter the porosity and strength levels of the foam structure
- The customization option of adding dye to customize the color of the foam structure
- Simple mixing and drying techniques are used to formulate and produce the capillary foam materials

Potential Commercial Applications

- Building construction
- Insulation
- Specialty packaging
- Personal care
- Shock absorption
- Facilitating the development of new materials in industries such as biomedicine, advanced electronics, or food processing

Background/Context for This Invention

Existing foam materials adequately meet the low cost / low quality insulation and padding needs of many

applications that require protective cushioning. In more advanced applications, there is an opportunity to provide more optimized foam cell structures that remain stable and have high strength levels over long periods of time even when high porosity levels are also included as a critical physical requirement.

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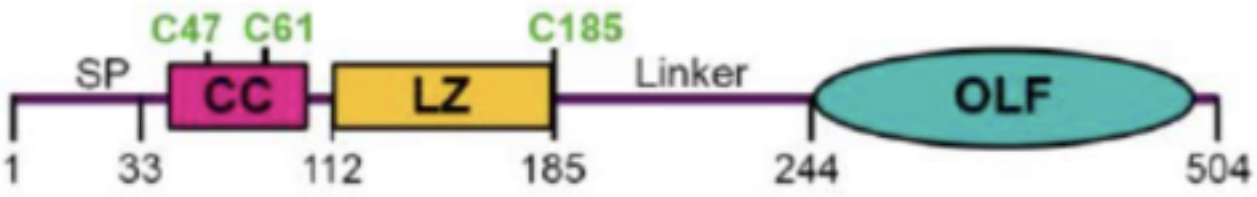
More Information

U.S. Patent Issued - US10934191B2

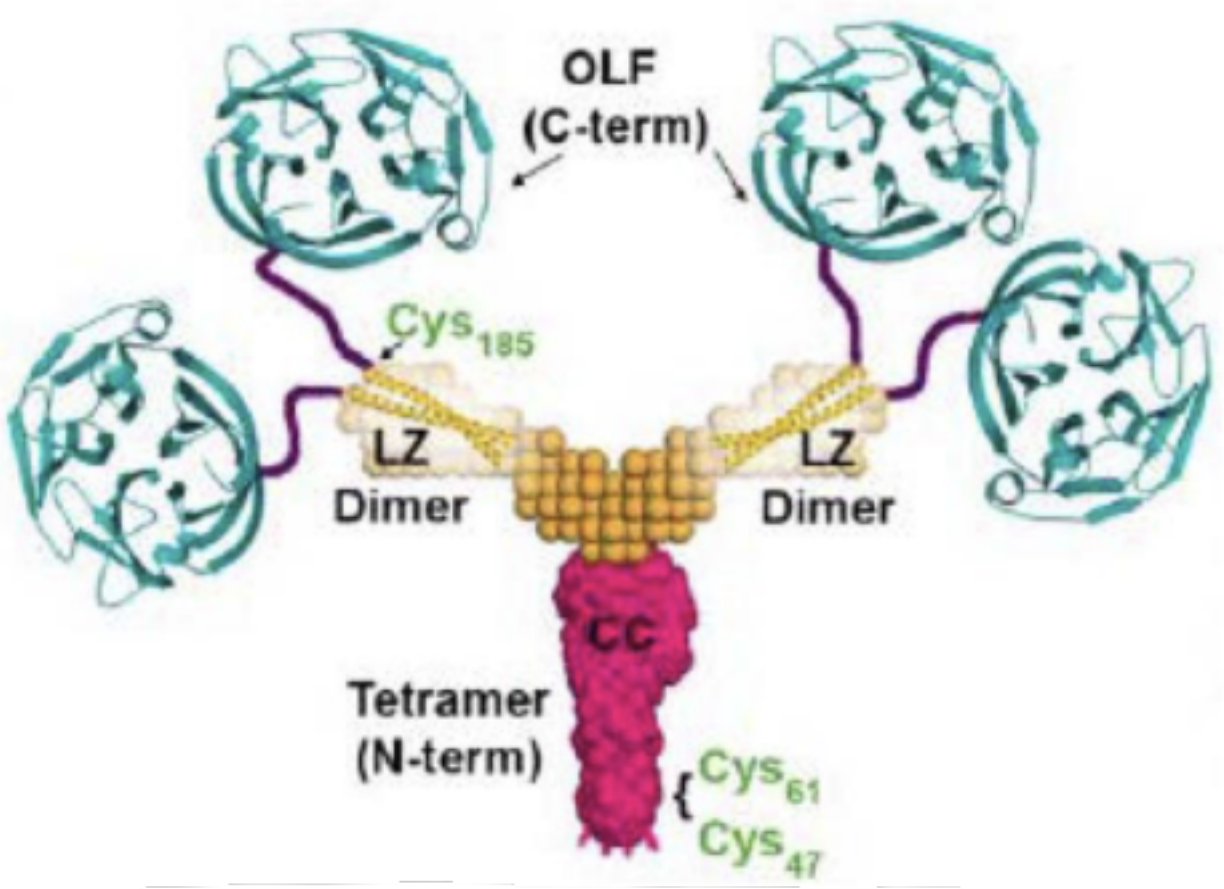
Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/lightweight-porous-materials-using-capillary-foam

Images:



The gene structure depicting the domains of myocilin, including signal peptide, location of key cysteine residues, and its coiled-coil, leucine zipper, and olfactomedin domains.



The myocilin quaternary structure based on solution X-ray scattering, X-ray crystallography, and chemical cross-linking experiments.