Rubber Encapsulated Pressure Sensor for Contact Sensing (#7591)

A contact force sensor based on a custom elastomer dome with a tailored air cavity adhered to a barometric pressure sensor

Georgia Tech inventors have developed a contact force sensor based on a custom elastomer dome with a tailored air cavity adhered to a barometric pressure sensor. In particular, the shape of the rubber enclosure surrounding the pressure sensor is controlled in order to achieve a desired force vs. pressure signal for the sensor. An air bubble is engineered between the rubber encapsulating the pressure sensor chip (and board) which changes shape and ultimately collapses as the force is applied to the sensor. The shape and collapse of that bubble, along with the entire structure of the rubber encapsulating the pressure sensor, govern the force vs. pressure behavior of the sensor. Similarly, the structure of the encapsulation allows the sensors to withstand inertial effects. As a result, they are suitable for any contact sensing in which the object is also undergoing dynamic movements.

Benefits/Advantages

- Controllable design for tunable force response
- Force and pressure sensor characteristics can be easily tailored
- Protected pressure sensor from high forces and pressures
- Suited for contact sensing where the object undergoes dynamic movement

Potential Commercial Applications

- Robust Contact Sensing
- Articulated robotic appendages

Background/Context for This Invention

Ground contact and force detection sensors are of critical technical importance in the realization of all manners of robots capable of locomotion and interaction with the environment. Requirements for field deployed sensors include ease of manufacture, durability, and consistency over time. Current force and contact sensors are cost prohibitive, unreliable, require training throughout time, are susceptible to inertial loads, or the sensing range is unsuitable for the application.

Dr. Claudio V. Di Leo
Assistant Professor and Director of the Multiphysics Mechanics of Materials Lab (M3Lab) – Georgia Tech School of Aerospace Engineering

Dr. Julian Jose Rimoli
Goizueta Junior Professor - Georgia Tech School of Aerospace Engineering

Mark F. Costello
Professor – Georgia Tech School of Aerospace Engineering, and School of Mechanical Engineering

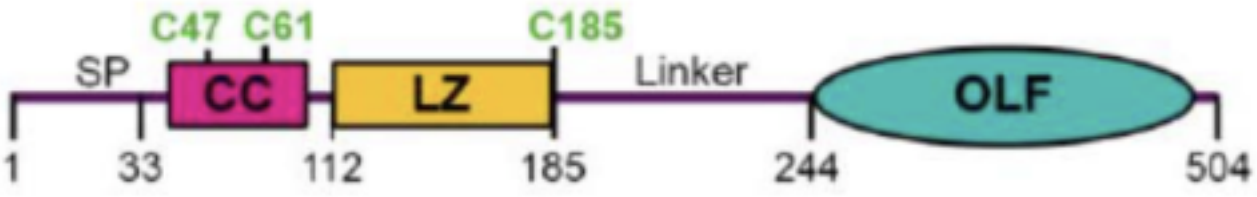
Benjamin Leon
Graduate Research Assistant at CAMM – Georgia Tech School of Aerospace Engineering

More Information

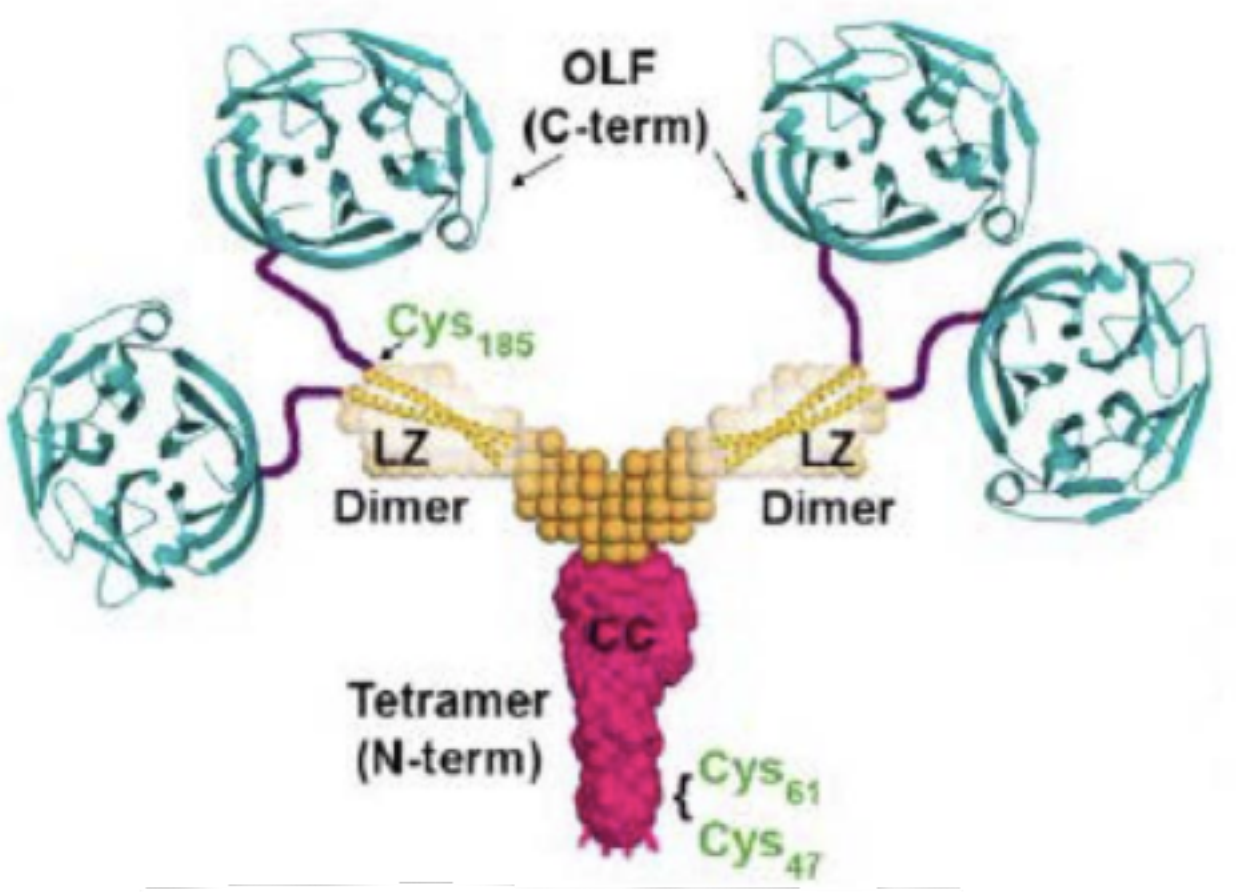
Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/rubber-encapsulated-pressure-sensor-contact-sensing

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.