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Highly Conductive, Thin, Flexible, and Stretchable Interconnect Material

-Potential Applications • Wearable electronics • Flexible or foldable electronics Benefits and Advantages • Mechanically durable and electrically stable • Highly conductive • Thin, stretchable, and flexible Invention Description Researchers at Arizona State University have developed a method to prepare a thin, flexible, and stretchable conducting composite with properties suitable for flexible electronic interconnects. This conducting composite—prepared with silver (Ag) and the widely available, low-cost, silicon-based organic polymer, polydimethylsiloxane (PDMS)—is sandwiched between two cured PDMS layers. These protective layers improve the mechanical stability of the interconnect, allowing for stretching up to 120% of its original length without compromising electrical stability. At around 300 µm thick, this interconnect material can be integrated into thin electronic packaging. Background Foldable electronics have become a major area of research as devices become smaller and more portable. When evaluating interconnects for flexible electronics, a trade-off exists between the material's mechanical and electrical properties. Materials like thin copper foils provide suitable conductivity but cannot be stretched or bent repeatedly over the lifetime of the product; bending fatigue and ultimately mechanical deformation lead to electrical failure. On the other hand, stretchable metal-polymer composites have failed to achieve foil-like thinness or the high conductivity needed to compete with metal counterparts. Hence, proper interconnects for flexible applications must be able to bend, fold, compress, or stretch while maintaining electrical stability and mechanical durability. Related Publication: High conductivity in thin, flexible, and stretchable interconnect with polymer composite in a sandwich structureFaculty Profile of Professor Hongbin Yu