

Tactile nanowire sensor

PHYSICAL SCIENCES: Materials

<p>The Challenge</p>	<p>Wearable sensors tend to be limited in terms of their ability to reflect complex systems. An example of such a system is the human ability to touch, which can simultaneously sense pressure, the location of the pressure and the shape of the object applying the pressure.</p> <p>An extra layer of complexity is introduced when the sensor needs to be functional in both stretched and unstretched states. This is similar to the functional requirements of human skin.</p> <p>There is a clear need to develop a sensor that can more closely imitate the sensitivity of human skin.</p>
<p>The Solution</p>	<p>Our solution is an electronic sensor with the ability to distinguish between sharp and blunt objects. This novel approach uses nanowires of different lengths that give varying electronic responses when pressurised. Applications include a range of wearable sensors to be used in healthcare and soft robotics.</p>
<p>Key benefits</p>	<ul style="list-style-type: none"> • Distinguishes between blunt and sharp objects • Flexible • Minimize pixels required • Strain-insensitive tactile sensing capabilities • Multiple design options
<p>Development Stage</p>	<p>Completed Proof of Concept.</p>
<p>Brief Description & Differentiation</p>	<p>A number of new designs have been developed that can produce a suitable response in wearable sensor applications, as shown in Figures 1 and 2.</p> <p>Nanowires are grown on a stretchable Eco-Flex substrate. The Eco-Flex is functionalised with APTMS and soaked in a solution with excess gold nanoparticles. The nanowires are grown through an interaction of a ligand, HAuCl₄ and an acid.</p> <p>Figure 1 shows nanowires of six different lengths that are grown on an Eco-Flex substrate. The various lengths are produced by sequentially masking the subsequent regions.</p> <p>Figure 2 shows a variation on this design is shown in Figure 3 where a circular disc sensor is used in a concentric layout.</p>
<p>Research Team</p>	<p>Led by Prof Wenlong Cheng (Department of Chemical Engineering).</p>
<p>Intellectual Property</p>	<p>WO/2020/006609</p>

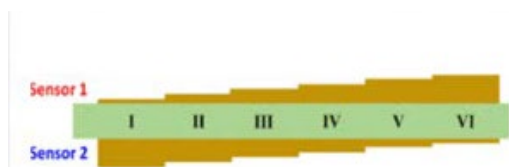


Figure 1: Nanowires grown on a substrate with sequential regions masked.

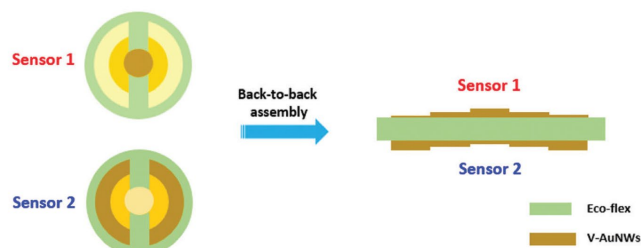


Figure 2: Circular disc sensor used in concentric layout.

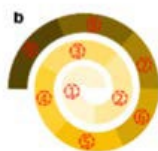


Figure 3. Spiral layout.