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作品編號	100034
參展科別	工程學
作品名稱	Graphene Nanoplatelet-Embedded Acrylic Paint for Low Cost Waterproof Paintable Capacitive Sensors and Free Standing Supercapacitors
得獎獎項	一等獎
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作者照片



Abstract

Modern capacitive touch input and proximity sensing technologies are rigid and limited to flat substrates making it impossible to apply them onto objects with irregular geometries like textiles or car handles. Furthermore, the high cost restricts the applications to small surfaces and cannot be scaled up to be applied on large surfaces such as walls. Therefore, a paint-on scheme would broaden the applications of capacitive touch input and proximity sensing devices. Paintable capacitive sensors are an emerging technology hindered by the high cost and lackluster properties of conductive paints. Existing conductive paints utilize expensive filler materials such as silver and gold to achieve high conductivity but suffer from low surface area. High surface area is critical for capacitive proximity sensors to detect objects from far distances and for overall sensitivity. Carbonaceous alternatives using micronized graphite exhibit low conductivity, require high loadings and most disintegrate when in contact with water. Multilayer graphene nanoplatelets are investigated for their high conductivity, high surface area, low cost, flexibility and eco friendliness. A waterproof acrylic latex is combined with multilayer graphene and dispersed via bath sonication. The optimal time of sonication and optimal graphene loading is determined through systematic testing. An Arduino Uno is loaded with a CapSense library and the graphene based paint is utilized as the interface to sense both touch and proximity.

【評語】 100034

作者選擇現有特殊之石墨烯材料，能夠製作價錢合理而又擁有優越導電性能之塗料，可用於電子元件。這是一項很好的工程科技作品。

The author pitched a special type of graphene which has reasonable price and yet unusual electric properties, which makes it suitable for electronic device application. This is a good example of engineering research.