GRAPHENE AND 2DM VIRTUAL CONFERENCE & EXPO

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Graphene-based transparent capacitive touch sensor for in-mold structural electronics

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Context

Explosion of human-machine interface market, e.g. home appliances & automotive interior design

➔ Growing demand for free form transparent electrodes (3D, bendable, strechable)

➔ Key opportunity for nanocarbon & graphene materials

Origo/Canatu

Symbiose

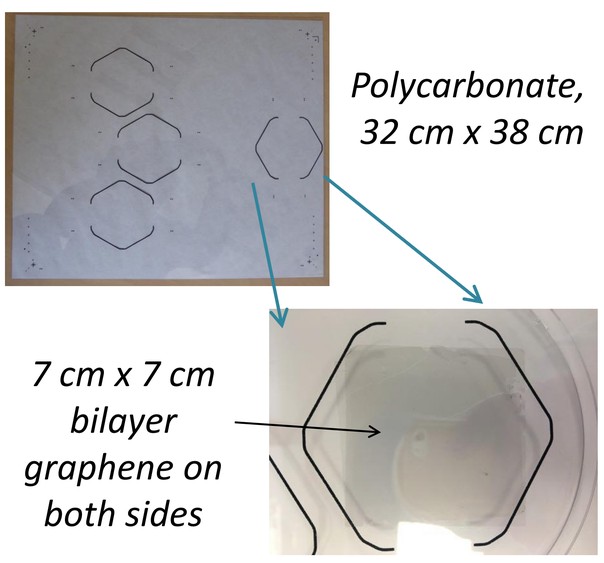
Bosch

Graphene integration in 3D overmolded transparent touch sensor

1. Graphene synthesis & transfer

Graphenea

Two-sided transfer on large size flexible substrate



Polycarbonate, 32 cm x 38 cm

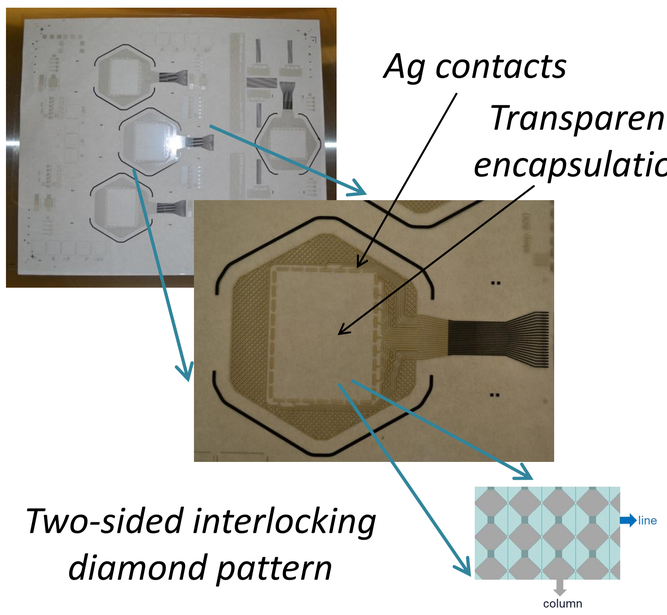
7 cm x 7 cm bilayer graphene on both sides

2. Graphene patterning & contacting

cea

Patterning by pulsed laser ablation

Screen printing of contacts & encapsulation



Two-sided interlocking diamond pattern

3. Thermoforming

WALTER PACK GROUP

Giving a 3D shape to touchscreen

Industrial mold

3D formed graphene touchscreen

4. Injection molding

SYMBIOSE ENGINEERING | DESIGN | DEVELOPMENT

Overmolding touchscreen in plastics

In-mold graphene touchscreen

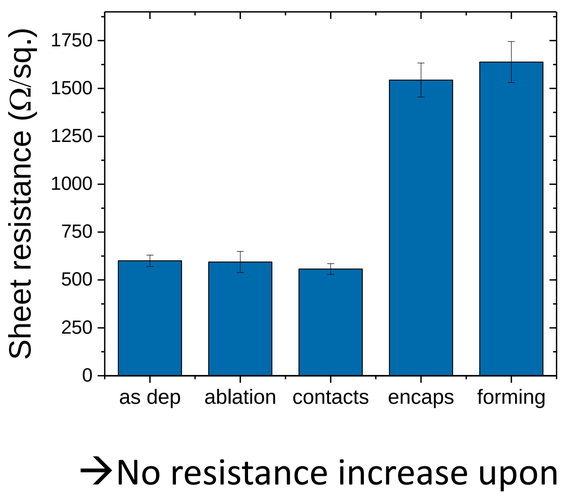
➔ **One sheet two-sided capacitive touchscreen**

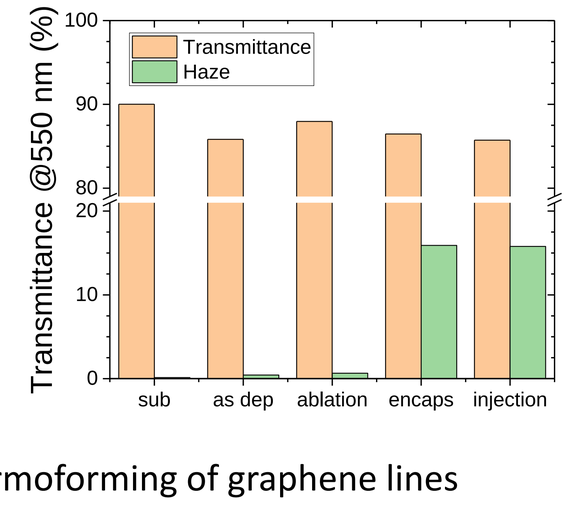
➔ **Graphene-based flexible & transparent touchscreen**

➔ **First demonstration of graphene electrode thermoforming and injection molding**

Optical & electrical performances

Impact of processing on bilayer graphene on polycarbonate performances

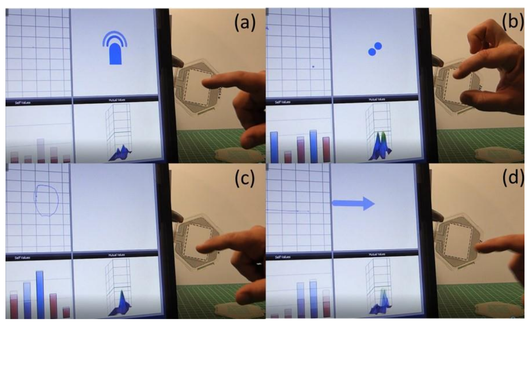




→No resistance increase upon thermoforming of graphene lines

→Encapsulation degrades both electrical & optical performances

In-mold graphene structural electronics



Graphene touchscreen demonstrator with multi-touch & gesture interpretation: (a) double-click (b) two-finger zoom (c) drawing (d) right swipe

➔ **An in-mold, transparent, capacitive touchscreen (multi-touch and gesture) with two-sided bilayer graphene electrodes**

➔ **Excellent optical properties** (86.6 % transmittance @550 nm with only 1% haze with optimized encapsulation)

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FROM RESEARCH TO INDUSTRY cea tech

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GRAPHENE FLAGSHIP

Flexible electronics

Graphene online 2020