

Graphene in Morph concept

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Our future mobile device, Morph, will act as a gateway. It will connect the user to the local environment as well as the global internet. It is an attentive device that adapts to the context – it shapes according to the context. The device can change its form from rigid to flexible and stretchable. Buttons on the user interface can grow from a flat surface when needed. Users will never have to worry about the battery life. It is a device that will help us in our everyday life, to keep us connected. It is one significant piece of a system that will help us to be aware of our environment.

Without the new materials, i.e. new structures enabled by the novel materials and manufacturing methods it would be impossible to build Morph-like devices. Graphene has an important role in different components of the new device and the ecosystem needed to make the gateway and context awareness possible in an energy efficient way.

Graphene will enable the evolution of current technology e.g. continuation of the ever increasing computing power when the performance of the computing would require sub nanometer scale transistors by using conventional materials. With graphene it will be possible to enhance the performance and reach THz frequencies for the transistors without having cooling problems - a show stopper with in traditional high frequency electronics. This will enable energy efficient computing in the CPU

of the mobile device as well as within the self powered sensors combined with processing. Enhanced processing is also an essential part of connectivity, making the radio of the gateway perform as the current wired connections do.

Graphene is transparent and thin. These properties will lead to a new generation of components and devices with novel form factors. At first it will replace Indium Tin Oxide (ITO), which is fragile, toxic and becoming increasingly more expensive. Flexible displays are already coming to the market. Using a graphene ribbon network it will be possible to build stretchable connectors. The stretchable device will be a combination of miniaturized rigid components, stretchable substrate and a stretchable and bendable components.

Novel materials - such as graphene - and environmentally friendly, low cost manufacturing - such printed electronics - are crucial to the future of the electronics. Also, new methods to treat multiscale systems, e.g. to transfer information between molecular and macroscopic parts of the system, will open up totally new kinds of applications based on different principles than we are used to. The ability to control the electrical properties of graphene online will enable new kind of reconfigurable electronics, and most probably Morph will have properties that we might not even have thought of yet.



Tablet mode



Phone mode



Wearable mode