

MEGAMORPH

Market-Entry of Graphene-based
large-Area MOdulators with a
Radical Production of Holographic
displays

PUBLIC SUMMARY

Society is undergoing a new revolution because of virtual and augmented reality (VR/AR) with head-mounted display (HMD) and head-up display (HUD) technologies. The strong demand in their current stage is already disrupting the market of digital games and entertainment (CAGR >40%), and an explosive growth is expected as soon as new display technologies enable their market uptake in every other sector: education and Industry 4.0; security and healthcare; aviation, transport, and even space.

Portable devices such as smartphones or laptops usually suffer from short battery life because their emissive displays need to convert electricity into light to show images and videos. Exceptionally, e-book readers use reflective-type (epaper) displays that are less power consumptive, although this comes with the cost of being unable to offer colourful images and video-ready frame rates. These standard technologies cannot meet the requirements for HMD/HUD applications: higher-resolution imaging through smaller pixels that can change their color faster, with less electrical power and withstanding high optical powers. GMOD technology is the solution.

GMOD@ inside

A Graphene MODulator (GMOD) is a reflective-type display with a metasurface frontplane whose pixels can tune the sunlight to reflect natural colors or modulate RGB sources to create wide color gamuts. These pixels are freestanding micro-membranes that physically move to modify the ambient illumination (no light generation) and produce great contrast in bright environments, thus enabling ultra-high resolution while slashing down the average power consumption in HMD/HUD and other portable devices.

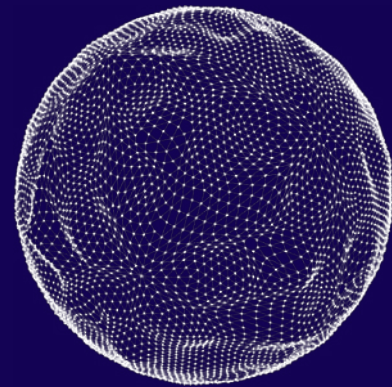
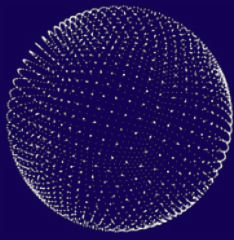
GMOD is a green tech using chemically-vapor-deposited (CVD) graphene, a biocompatible and environmentally friendly material. Graphene is the thinnest and strongest material known, which is ideal for micro-membrane pixels. As graphene is also a great electrical conductor, the micro-membranes can be moved with small voltages. However, the price of CVD graphene is too high for its integration into products.

Market-driven

MEGAMORPH project will make GMOD-based large-area display evaluation kits to be showcased by our commercial partners, so to gain support from the private sector and bring our combined technologies to the market by 2024. Success will unlock a powerful consequence: the price reduction of CVD graphene.

We will finalize the development of GMOD displays started in ATTRACT Phase 1 (GIMOD Project) by scaling up the frontplane sizes with a flat-panel display (FPD) process and by integrating custom backplane, electronic drivers, firmware, and software into industrial evaluation kits (TRL 8).

With the consortium support, Atrago will demonstrate a business case (holographic imaging) and enter the Industry 4.0, healthcare and aviation sectors with GMOD flat-panel displays for HMD/HUDs, smartphones, and e-books. We will reshape the display landscape in Europe and lead the world towards a more sustainable, green future.



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