

HEA2D – Production, function and application of 2D-Nanomaterials

HEA2D is a collaborative project between two Universities (University of Siegen, University of Duisburg-Essen), a research institute (Fraunhofer Institute for Production Technology, Aachen) and three industrial partners (Aixtron, Coatema Coating Machinery and Kunststoff-Institute Lüdenscheid). The goal of the project is to develop a scalable technology for electronic and optoelectronic components based on flexible two-dimensional materials for potential applications in the automotive industry, in particular integrated into plastics. We envision touch elements, photodetectors and light emitting diodes based on two-dimensional (2D) materials to be integrated into automotive parts like the dashboard using low-cost manufacturing technologies.

The HEA2D consortium conducts research along the entire value chain starting from scalable material depo-

sition of 2D materials, transfer onto polymer foils and manufacturable integration into plastic components. The goal is to demonstrate electronic and optoelectronic devices on flexible substrates and to enable their integration into mass-market plastic components. The University of Siegen in particular spearheads research activities related to capacitive and optoelectronic sensors and new manufacturing technologies on flexible foils. The consortium utilizes the platform NMWP e.V. and the Cluster „Kunststoffland NRW“ to disseminate the research results in North-Rhine Westphalia.

First results yield flexible light detectors made from graphene and amorphous silicon that operate in a wide spectrum from ultraviolet to near infrared. These hybrid optical sensors can be bent and strained up to 1% while still maintaining their initial functionality.

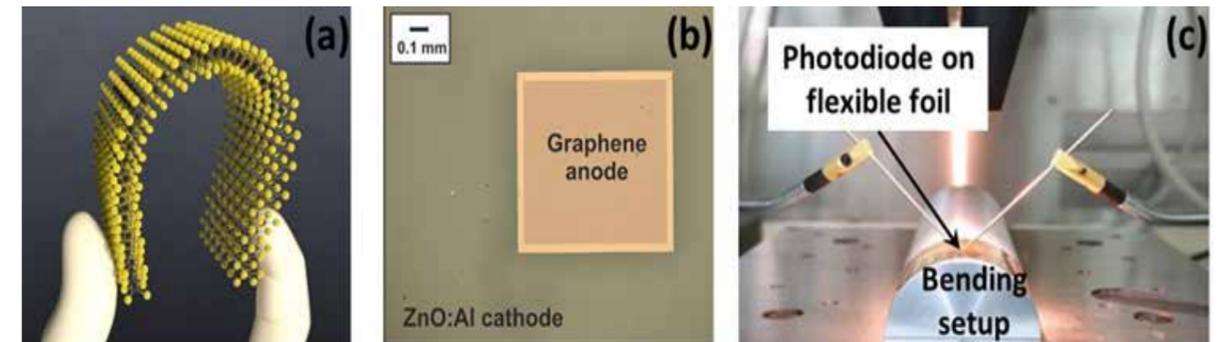


Figure 1: (a) Rendered image of a two-dimensional material subjected to bending, (b) Optical image of the fabricated photodiode device, (c) picture of the bending set-up with the photodiode placed on a semi-cylindrical rod of predefined radius to induce tension. Figure 1a. Copyright of Stefan Wagner. Reference for the image 1b-c [1]: [1] D. S. Schneider, A. Bablich, and M. C. Lemme, "Flexible graphene-/a-Si: H multispectral photodetectors," in Device Research Conference (DRC), 2016 74th Annual, 2016.

I Project Management and Execution

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