PD IEC TS 62607-6-3:2020

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Nanomanufacturing — Key control characteristics

Part 6-3: Graphene-based material — Domain size: substrate oxidation

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National foreword

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Nanomanufacturing – Key control characteristics – Part 6-3: Graphene-based material – Domain size: substrate oxidation

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NANOMANUFACTURING – KEY CONTROL CHARACTERISTICS –

Part 6-3: Graphene-based material – Domain size: substrate oxidation

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IEC TS 62607-6-3, which is a Technical Specification, has been prepared by technical committee 113, Nanotechnology for electrotechnical products and systems.

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The text of this Technical Specification is based on the following documents:

Enquiry draft	Report on voting
113/496/DTS	113/549/RVDTS

Full information on the voting for the approval of this Technical Specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC TS 62607 series, published under the general title *Nanomanufacturing – Key control characteristics*, can be found on the IEC website.

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INTRODUCTION

Graphene with two-dimensional honeycomb structures of carbon atoms is known to have exceptional electrical, thermal, and mechanical properties. Because of these properties, graphene is considered for applications in high speed, flexible and transparent devices. Figure 1 shows the images of graphene field effect transistor, flexible touch screen in display, and transparent electrode in solar cell. These applications of graphene are promising candidates for nanoelectronics and optoelectronics. Graphene has been widely investigated by researchers from academic institutions, research institutes, and industries.

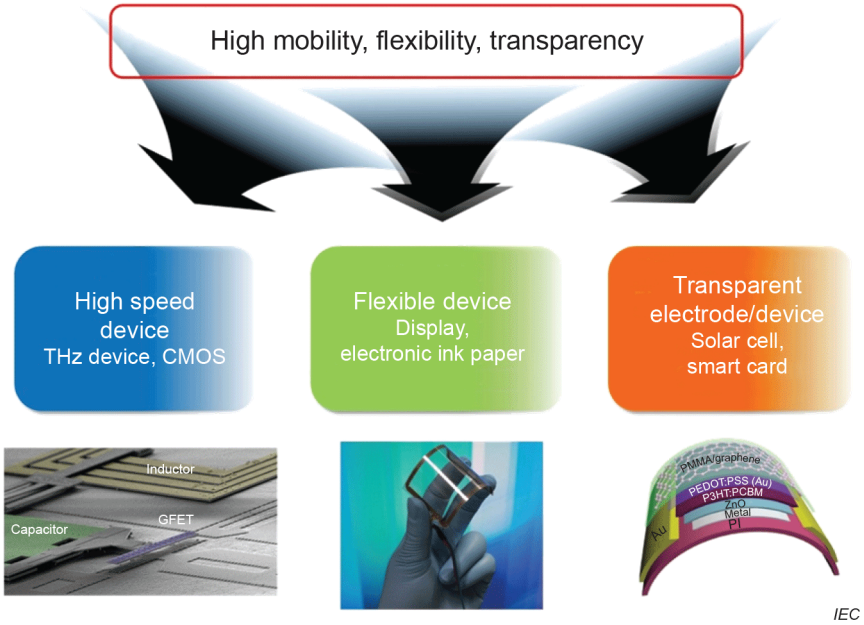

Figure 1 – Applications of graphene

Graphene synthesized on Cu or Ni substrate by chemical vapour deposition (CVD) is composed of graphene domains formed during the nucleation and initial growth stage. Graphene defects, such as pinholes, domain boundaries, and cracks, can be formed during the CVD growth or the transfer process.

Properties of graphene are related to the size and distribution of graphene domains and defects. As graphene domain size is increased and graphene defects are reduced, electrical and thermal properties of graphene are improved.

Graphene domains and defects are usually observed by atomic force microscopy (AFM), scanning electron microscopy (SEM), transmission electron microscopy (TEM), Raman spectroscopy, and scanning tunnelling microscopy (STM). These analysis methods may cause inconvenience in preparing a sample for analysis and require very expensive equipment that provides only local information of several micrometres and below.

Facile, fast, reliable methods of evaluating graphene domains have not yet been established and urgently need to be developed.

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