Bridged graphene domains by conductive materials for higher electrical conductance

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Transparent conductive electrodes (TCE) have been used in many optoelectronic devices such as liquid crystal displays (LCD), organic solar cells, organic light emitting diodes (OLED), touch panels, etc.[1,2] For the past decades, Indium tin oxide (ITO) has been widely used in terms of its high electrical conductivity and optical transparency. However, there are several problems on ITO such as high cost of indium, limited use on flexible substrates due to brittleness. Recently, graphene has attracted much attention because of its unique structure and properties. In particular, high conductivity, flexibility and optical transparency enable graphene to be a promising material for flexible transparent conductive electrodes.[3] In spite of successful synthesis of graphene by chemical vapor deposition (CVD) method, electrical properties below the ideal value have been reported. Many boundaries between graphene domains are suspected as a main factor for degradation of electron transport properties.
Here, we report the electrical conductance in optically visualized graphene channels with multi domains by aligned liquid crystal is reduced significantly.