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Printed Electronics Using Graphene Links

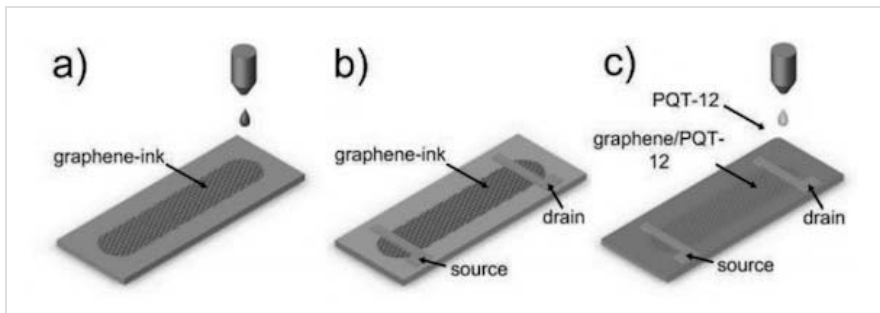
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Posted by Madhumita Sridhar on November 25, 2011

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Graphene, also called as the "wonder material" owing to its never ending list of applications, has yet another one lined up in this list. It can be used along with ink jet printers to flexible and thin-film transistors. The one atom thick layer of carbon along with inkjet technology can promise cheap, flexible electronics for everyday items and clothes in the near future. The possible applications include digital paper and disposable radio-frequency identification (RFID) tags.

Earlier AIST, Japan created a similar one but not with graphene, they used semiconductor crystals. The researchers from Cambridge, UK have taken that technology a step higher by using a better material instead of semiconductor crystals. The obvious choice is Graphene. It has excellent electrical conductivity and mobility. It is because of the hexagonal lattice arrangement of atoms in graphene. But there is problem with the use of graphene. It should not block the printer heads and after the ink is combined with graphene, it should be able to produce tiny droplets. Both of these properties are essential for the proper function of the printer.



The discovery to overcome these possible problems is what makes this technology even better. Graphene is done by exfoliating layers from a block of graphite. Then it is filtered to remove any thing that may clog the printer heads. When the solvent evaporated an effect called coffee ring effect can occur. To avoid this effect the flakes are added to N-Methylpyrrolidone (NMP). The ink so produced can be used for printing electronics. The group's demo of a transistor device shows a mobility of $95\text{cm}^2\text{V}^{-1}\text{s}^{-1}$, and 80 per cent transmittance with $30\text{k}\Omega/\text{sq}$ sheet resistance. The results they show are not bad for a first attempt. Improvements are sure to follow.

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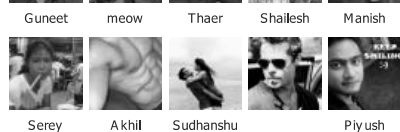
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