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PII: S0040-6090(17)30578-3
DOI: doi: 10.1016/j.tsf.2017.07.074
Reference: TSF 36140

To appear in: *Thin Solid Films*

Received date: 20 January 2017
Revised date: 15 June 2017
Accepted date: 29 July 2017

Please cite this article as: Giampiero Amato, Federico Beccaria, Federica Celegato , Growth of strained, but stable, graphene on Co, *Thin Solid Films* (2017), doi: 10.1016/j.tsf.2017.07.074

Growth of strained, but stable, graphene on Co

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Abstract

Mostly single-layer graphene with enhanced mechanical stability is demonstrated over polycrystalline Co film deposited onto a SiO_2/Si substrate. Raman and electrical characterizations evidence that the continuous graphene layer can be easily transferred without the aid of any polymeric support, but preserving its quality. Better stability to the damaging action of the laser beam, as compared to the Cu-grown material is observed, together with electron mobility values in the 10^4 $cm^2V^{-1}s^{-1}$ range. It is suggested that most of the C atoms precipitate on surface during the first 30 °C of cooling, because of the higher activation energy of C solubility into Co respect to Ni. Tensile stress is found to originate in graphene regions grown onto Co film discontinuities. Strain in the sheet is also observed after transfer. This opens possible routes to engineer the electronic spectrum through a control of the strain during growth.

Keywords: graphene; vapor deposition; strain; precipitation

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