Ultra-fast synthesis of Graphene on poly-crystalline metal foils

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Introduction

Here we present an innovative and ultra-fast process to deposit good-quality Graphene on different metal foils. The graphene layer can be homogeneously deposited during one minute process time. The process is a magnetic filtered high current arc evaporation[1].

The apparatus

Process parameters



Figure 1: Modified magnetic filtered high current arc evaporation

Process time	45 s
Substrate temp.	975 °C
Arc current	2500 A
Filter current	200 A
Gas mixture	Ar/H ₂
Gas ratio	$Ar:H_2 = 5:1$
Gas pressure	120 Pa

Table 1: Process parameters for the graphene synthesis

Results on copper in hydorgen enriched Argon atmosphere



Figure 2: (*left*) Raman spectrum of Graphene on copper foil (*middle*) Microscopic image of copper foil (*right*) Mapping of Raman 2D/G peak ratio (marked region).

Conclusion

Using the pulsed carbon arc source, high quality graphene can be grown on metal foils in less than one minute. Furthermore, this process can be used for the formation of transparent and conductive Graphene-like carbon coatings on insulating substrates [2]. Consequently, this fast growth process can pave the way to a fast and cost effective Graphene synthesis for the mass production e.g. in a roll-to-roll process.

References

[1] H.-J. Scheibe, B. Schultrich, H. Ziegele, P. Siemroth, *Deposition of superhard amorphous carbon films by pulsed arc sources*, IEEE Transaction on Plasma Science, PS-25, 685 (1997) [2] H. Lux et al., Journal of Applied Physics 117, 195304 (2015)

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