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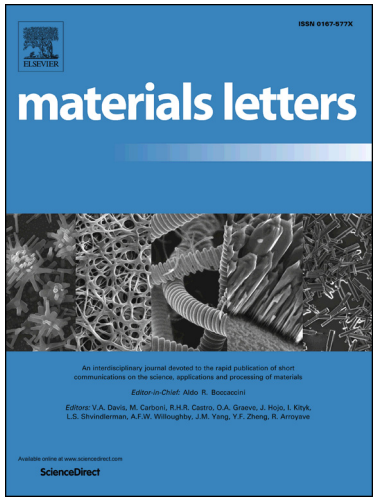

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Co-synthesis of large–area graphene and syngas via CVD method from greenhouse gases

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Abstract

In this study, we report a novel and efficient way to produce large–area graphene and syngas simultaneously from CH_4 and CO_2 via CVD. The successful synthesis of syngas was confirmed by online gas chromatography characterization whereas the graphene produced within the same process was verified using Raman spectroscopy, Raman mapping and HRTEM. This work helps to better understand graphene growth from CH_4 and CO_2 and improve the CVD method by providing a novel pathway for the synthesis of large–area graphene with a valued by-product. With our derived CVD approach, graphene was grown while producing syngas and consuming green-house gases which is of great importance in this current climate change phenomenon.

Keywords: carbon materials, graphene, syngas, biogas, carbon dioxide, chemical vapor deposition

1.0 Introduction

Graphene is virtually transparent since it is a layer of sp^2 carbon based allotrope with thickness of one atom [1,2]. Large–area graphene is a material that can enable hundreds of new applications, from flexible