明志科技大學材料工程系107學年四技專題製作競賽

The synthesis of multi-layer graphene-like structure using paraffin based laboratory parafilm waste and commercial candle as the hydrocarbon solid precursor

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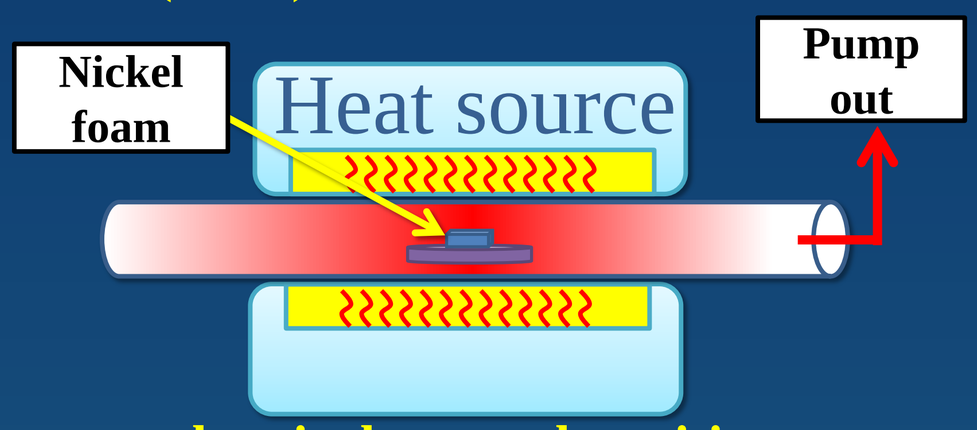
Introduction

In this study, we successfully used paraffin based commercial products as the hydrocarbon solid precursor to synthesize multi-layer graphene-like structure on Ni foam. Ni foam was placed into the quartz furnace, both of laboratory parafilm waste and commercial candle were used as the carbon source in our home-made furnace for growth of graphene-like structure via the chemical vapor deposition (CVD) method.



chemical vapor deposition (CVD)

Experimental steps

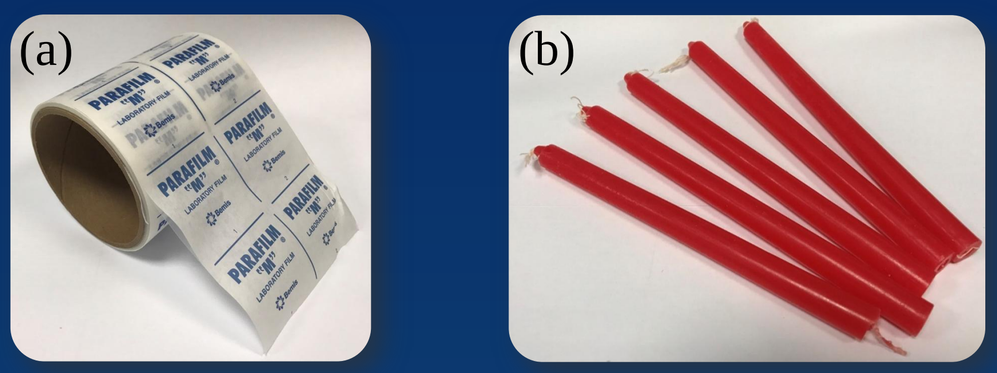
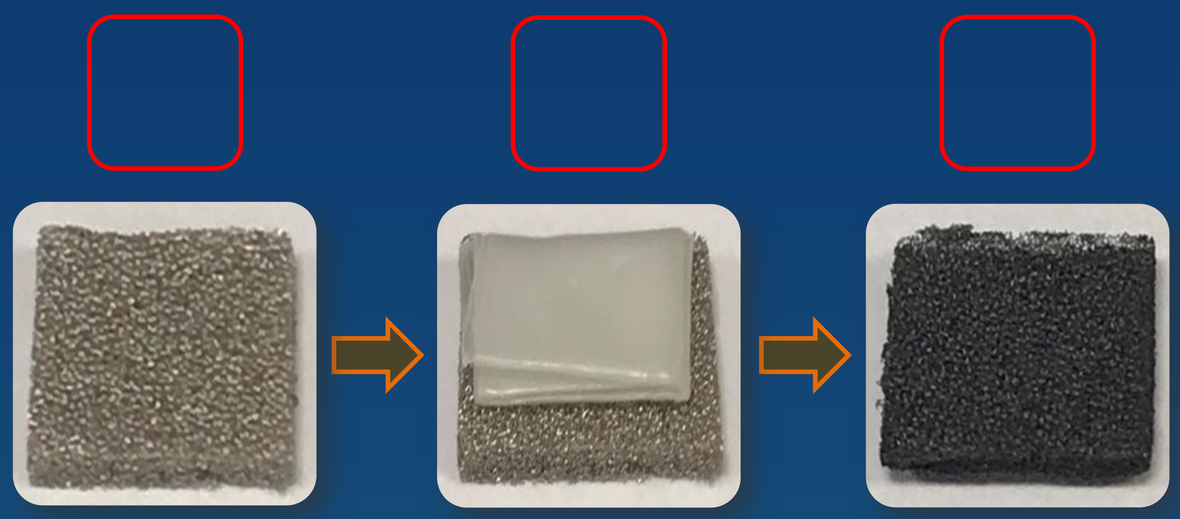


Fig. 1 Images of (a) parafilm, (b) candle



Nickel foam → Parafilm wrap on nickel foam → CVD graphene on nickel foam

Results

Analysis: Raman and XRD

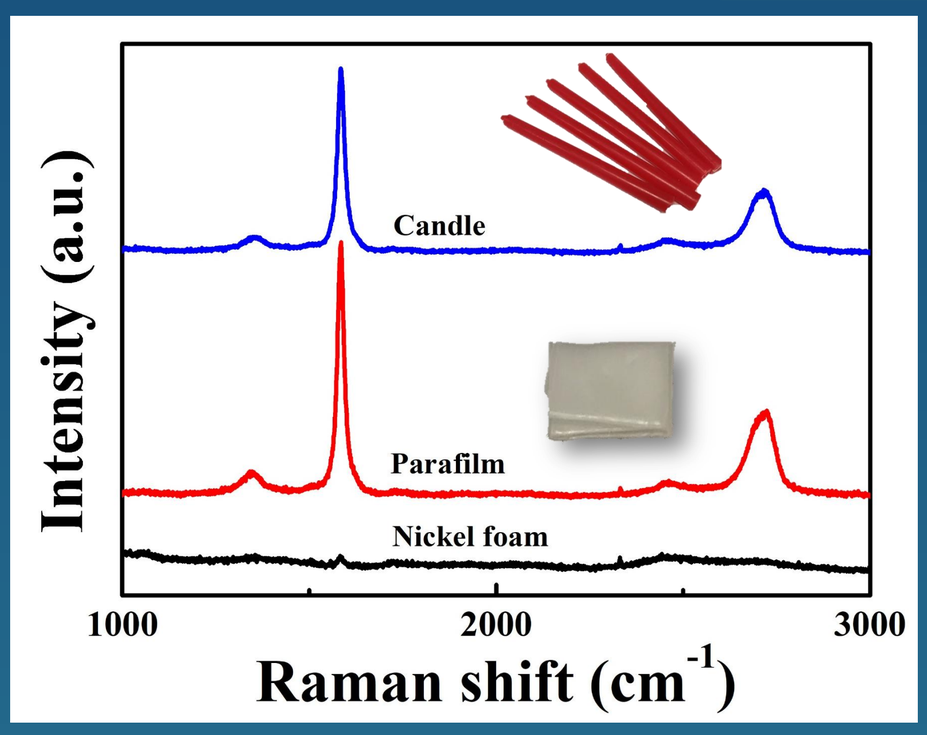


Fig. 2 Raman results of graphene grown on nickel foam.

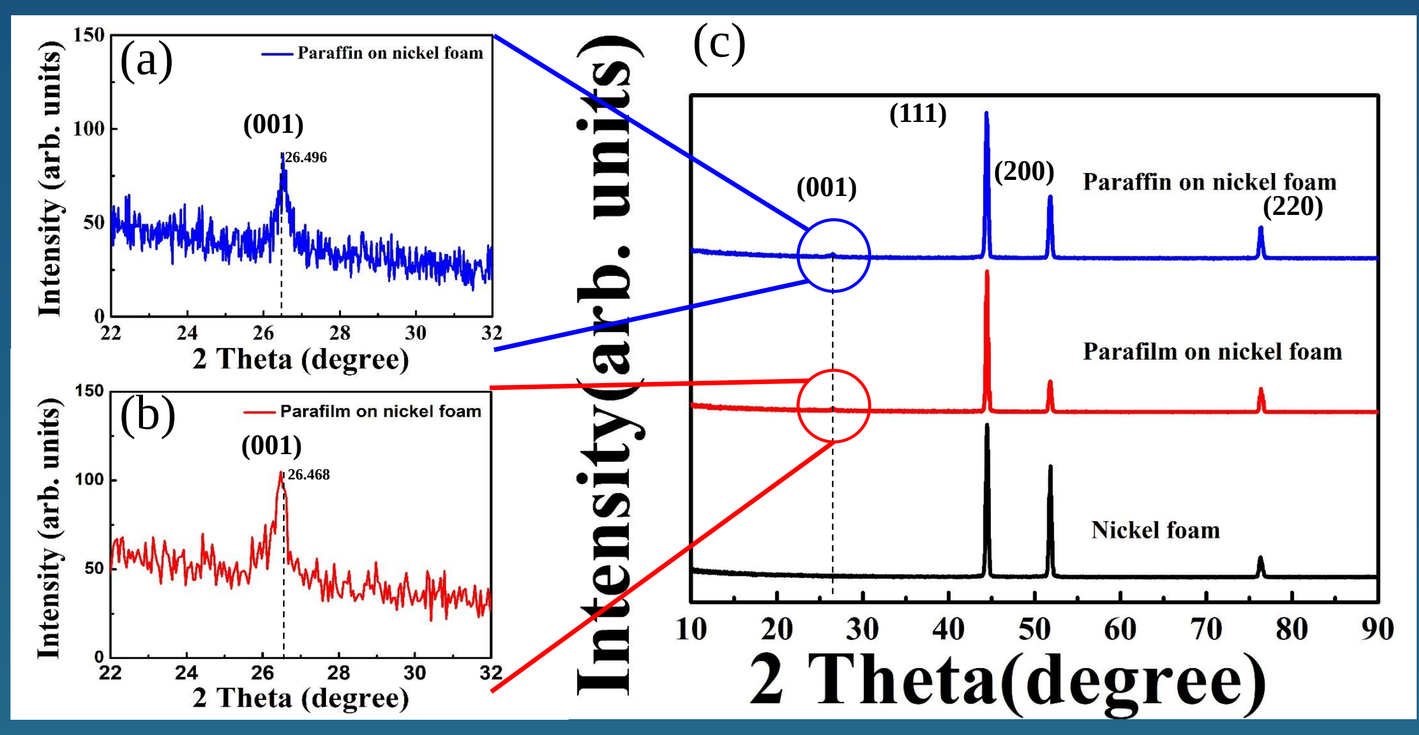


Fig. 3 XRD results of graphene grown on nickel foam.

TEM

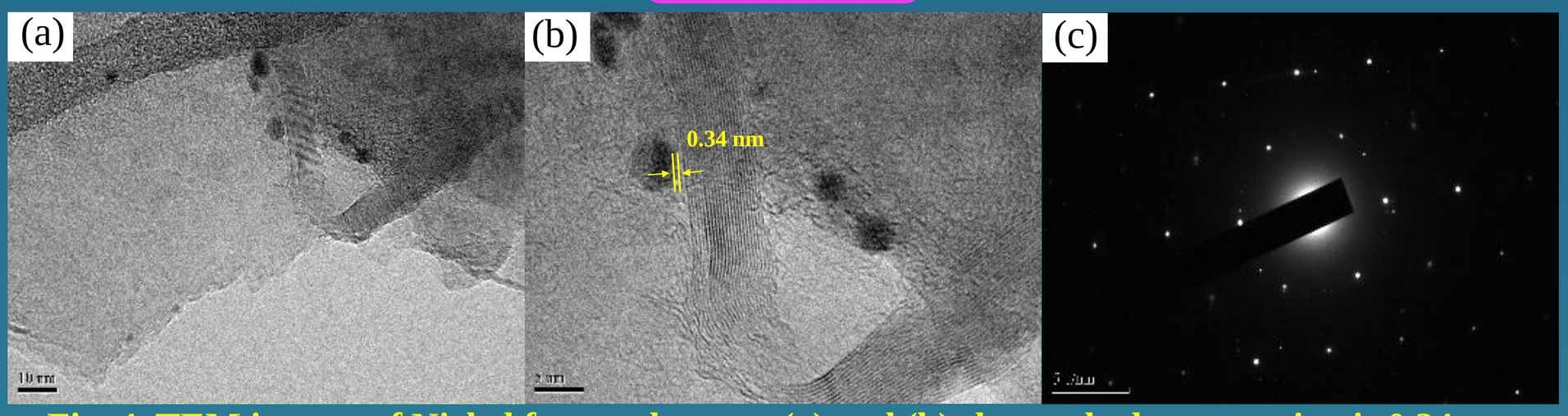


Fig. 4 TEM images of Nickel foam substrate, (a) and (b) shown the layer spacing is 0.34 nm.

Conclusion

- Using parafilm and paraffin candle as a carbon source can successfully grow graphene without inert gas.
- Raman results show D band, G band, 2D band at 1345 cm^{-1}, 1583 cm^{-1}, 2723 cm^{-1}, and XRD results show 2 Theta at 26.48 degree, those results demonstrate graphene-like characteristics.