

Thermal Raman Spectroscopy of Single-Layer Graphene on Various Plastic Substrates

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Abstract

Recently, we are seeing more and more use of graphene for flexible electronics and thus transferring to flexible polymer substrates. Since these electronics are heated and do not operate at constant temperature, it is therefore useful to investigate the behaviour of single layer graphene on plastic substrates. This was achieved using thermal Raman spectroscopy, where spectra of graphene on the most commonly used plastic substrates were collected over a temperature range from $-100\text{ }^{\circ}\text{C}$ up to the melting temperature of the substrate. Graphene on non-polymeric solid substrates tends to decompose with increasing temperature in a linear dependence on the thermal expansion of the substrate [1]. For polymeric substrates this rule does not apply due to their different molecular and atomic arrangements and even after melting of the substrate graphene did not show signs of degradation. Moreover, internal changes in the substrate such as glass transition could be observed in the shifts of the G and 2D peaks.

References

- [1] Průcha, L., Lejeune, M., Kizovský, M., Materna Mikmeková, E., *Materials Today Communications* 35 (2023) 105921. <https://doi.org/10.1016/j.mtcomm.2023.105921>.

Figures

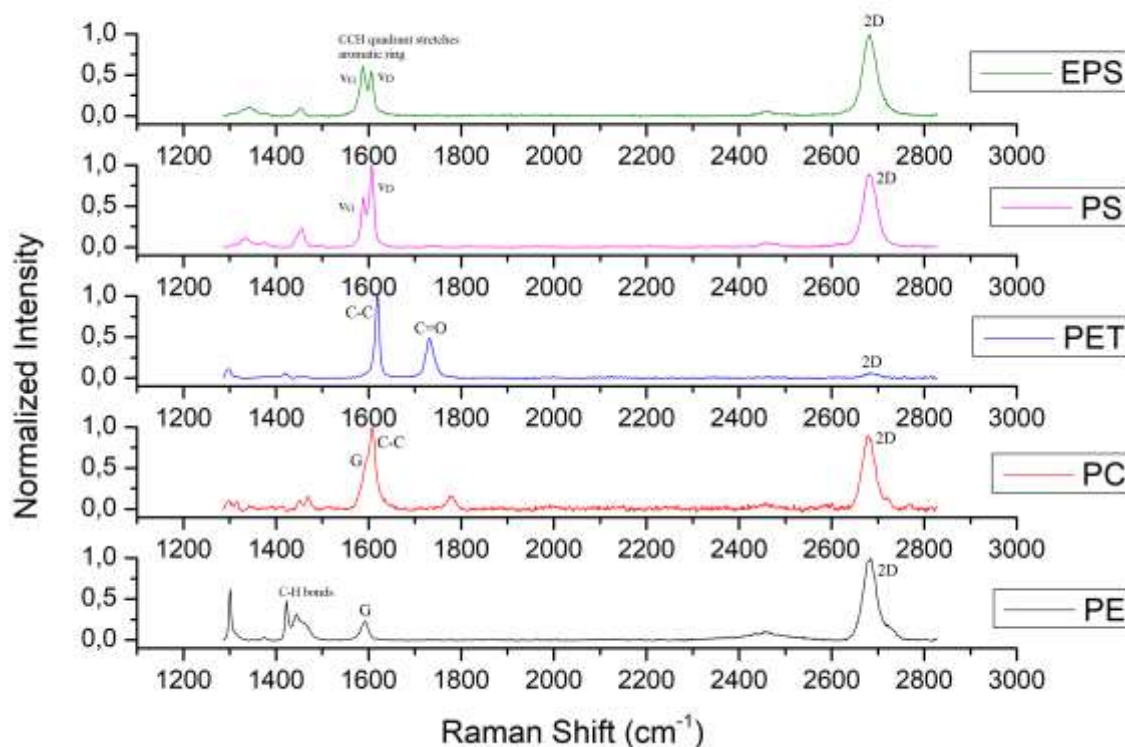


Figure 1: Raman spectra of graphene on 5 different plastic substrates.