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Raman Peak Analysis and Assignment in Conjugated Polymers

Conjugated polymers have vast applications across biosensors, drug delivery systems, organic electrochemical transistors (OECT), organic photovoltaics (OPV), organic emitting diodes (OLED), and thermoelectric generators (TEG).[1] These organic materials, are macromolecules characterized by an alternation of double and single bonds on their backbone, making them ideal candidates for various optoelectronic applications. By introducing electron-rich or electron-poor molecular units, one can effectively introduce electrons or holes into the polymer, thus fine-tuning its properties and enhancing performance.[1]

One of the advantages of these polymers is the fact that they are Raman active. This makes it possible to stut study of various components, including the backbone responsible for conjugation and any introduced side chain modifications aimed at tuning solubility or studying the doping gradient of electrically programmed channels.[2-3]Furthermore, Raman Spectroscopy extends to include the examination of transitions occurring within these materials. It is well-documented that organic compounds often exhibit multiple glass transitions, indicative of structural alterations across varying temperature regimes.

In this work, we attempt to analyze these transitions, distinguishing structural changes within the transition range performing Raman at variable temperatures. Such insights prove invaluable in understanding the dynamic behavior of these materials, giving us the opportunity to design strategies for enhanced performance optimization. Thus, Raman Spectroscopy emerges not only as a powerful analytical tool but also as a gateway to unlocking the full potential of organic materials across numerous applications, ranging from optoelectronics to biomedicine.

References

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