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Raman spectroscopy of carbon atomic wires

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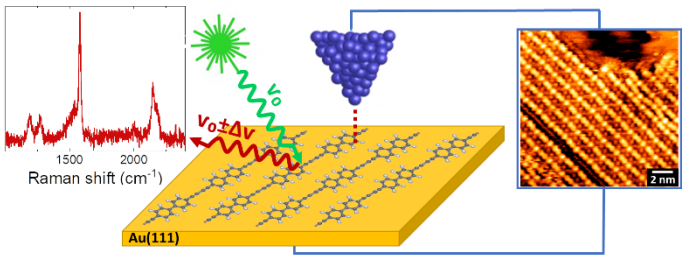
Abstract:

In the last 30 years fullerenes, nanotubes, and graphene have pushed further the fundamental science of carbon opening new opportunities for nanotechnology applications. These achievements have nurtured the interest in searching novel carbon nanosystems, such as linear carbon atomic wires and 2D carbon structures beyond graphene. Carbon atomic wires as linear structures with *sp*-hybridization are the ultimate 1-D carbon systems interesting for fundamental open questions and with a largely unexplored potential for material science and engineering.[1] By combining carbon atomic wires and sp^2 carbon, 2D crystals beyond graphene can be realized such as graphdiynes with peculiar electronic properties. Besides the experimental synthesis of both carbon atomic wires and 2D sp-sp^2 structures, the characterization is a key step to give insight into the structure and electronic properties of these systems.



Vibrational spectroscopy (Raman and surface enhanced Raman scattering - SERS) is a powerful technique for the investigation of structure-property relationship giving sensitivity to the carbon-carbon bond and even to charge transfer effects induced by interaction with metal nanoparticles.[2,3]

For different experimentally available 1D and 2D systems containing carbon atomic wires, Raman spectroscopy is proven as a fundamental technique to be paralleled with other techniques such as scanning tunneling microscopy to couple molecular bond information with atomic-scale imaging. [4,5]

References

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