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Low-temperature spectroscopic studies of single molecules in 3-D and on 2-D hosts

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Citation

Smit, R. (2024, June 12). *Low-temperature spectroscopic studies of single molecules in 3-D and on 2-D hosts*. Retrieved from https://hdl.handle.net/1887/3762935

Version:	Publisher's Version
License:	Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden
Downloaded from:	https://hdl.handle.net/1887/3762935

Note: To cite this publication please use the final published version (if applicable).

Stellingen

behorende bij het proefschrift

Low-temperature spectroscopic studies of single molecules in 3-D and on 2-D hosts

1. Of all narrow molecule emitters, perylene is the best candidate for experiments on narrow resonances to the triplet state (Chapter 2,3 and 6 of this thesis).

2. Without knowledge of the particular alignment of a molecule in a crystal, electric fields cannot be mapped reliably by the Stark shift induced on the molecule (Chapter 4 of this thesis).

3. The efficiency of migration of triplet excitons to guest molecules relies critically on the purity of the host material (Chapter 3 of this thesis).

4. Organic contamination is the most likely source of two-level systems detected through spectral jumps in the fluorescence from molecules on hBN (Chapter 5 of this thesis).

5. The immobilization of molecules on hBN cannot be merely governed by van der Waals interactions with defect-free hBN (Chapter 5 of this thesis).

6. The use of boron nitride nanotubes could solve the problems that arise during encapsulation of molecules by flat hBN layers [*Allard et al., Advanced Materials 32, 2001429 (2020)*].

7. Many studies in the literature on presumed hBN defects are rather studies of organic molecules protected by hBN, formed during 'activation' steps through thermal annealing [*Neumann et al., ACS Nano 17, 11679-11691 (2023)*].

8. The best way to identify an unknown molecule, such as "molecule X", is through scanning tunneling microscopy combined with fluorescence [*Imada et al., Science 373, 95-98 (2021)*].

9. Experimental science is expensive. More transparency and (loaned) sharing of materials and equipment on a European level could improve accessibility of expensive experimental research.

Robert Smit
Leiden, 12 Juni 2024