**Polyvinylpyridine- carbon dots composite-based novel humidity sensor**

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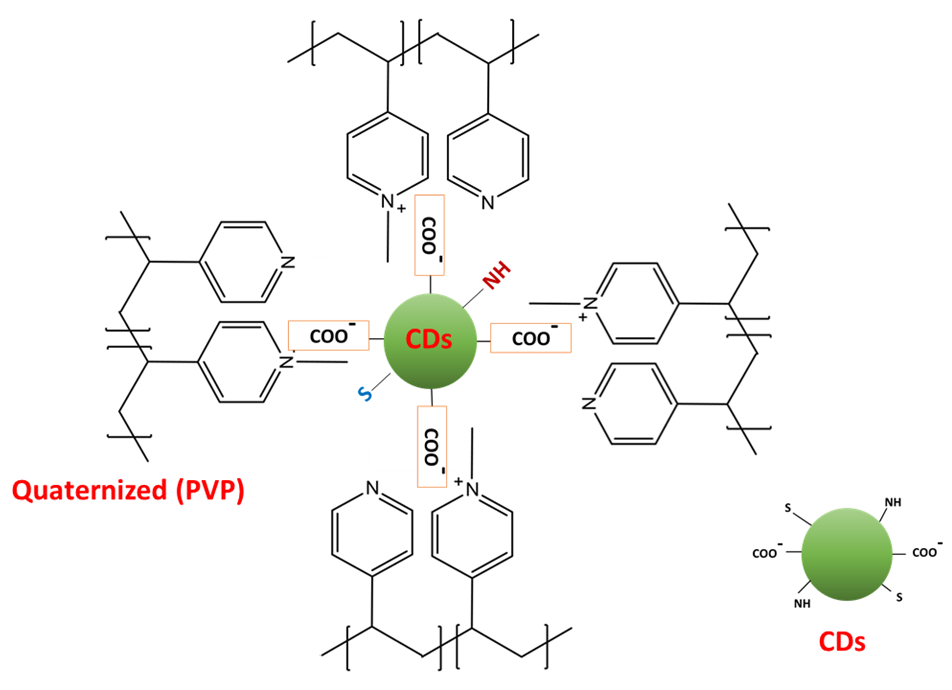
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**Supporting information:**

Increase in CDs concentration, induced the increase of hydrophilic groups , present on the prepared sensing films, Indeed the used CDs, are very hydrophilic , and rich in COO-, OH, S, and NH functional groups as previously confirmed a detailed Fig , showing in details the functional groups of both CDs and PVP , was added in the SI.1

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**Figure SI.1 : Chemical view, functional groups and interactions between PVP and CDs**



**Figure SI.2: Stability Response 0f 0.5wt% after six months of fabrication**



**Figure SI.3: SEM image of 0.5wt % PVP-CDs at different magnifications.**

The SEM of 0.5wt % PVP-CDs composite, at different 500 nm (figure SI.2 (c, d) and at (figure SI.2 (a, b) 1 µm, show the uniform particle size distribution with an average particle size of (200) nm and irregular spherical shapes.

**Table.S1.Calculation of Quantum Yield**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Integrated P.L. intensity | Refractive index | Quantum yield |
| Quinine sulphate | 403862.308 | 1.33 | 54% |
| GQD | 2.14755 E-5 | 1.33 | 28.7 % |

The quantum yield of CDs was calculated by measuring the integrated P.L. intensity in aqueous dispersion (refractive index η= 1.33) against quinine sulfate in 0.1(M) H2SO4 (refractive index η= 1.33) as a standard one having a quantum yield of 54%.

ΦC = ΦQS × (IC/IQS) ×( ηC2/ ηQS2)

Where, Φ, I, and η represented the quantum yield, the slope of integrated P.L. intensity, and the refractive index, respectively. The suffix QS and C denoted quinine sulfate and CDs, respectively.

ΦC = 54 × (2.14755 E-5/403862.308) × ( 1.332/1.332) %= 28.7 %