Green Synthesis of Fluorescent Carbon Nanomaterial to Minimize the Cross-Interaction of Aß42 and Tau Hyperphosphorylation

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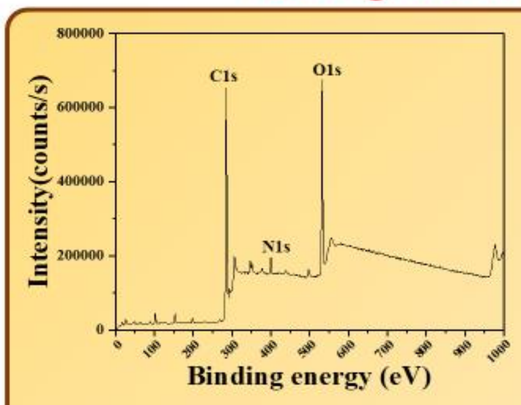
Abstract

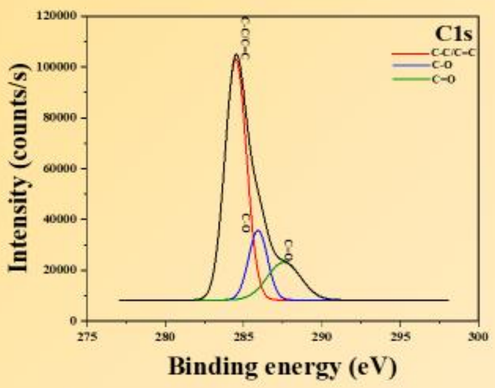
- Amyloid misfolding in Alzheimer disease is the hallmark in extraneuronal environment.
- Aß42 cross interacts with Tau inside the neurons disintegrating the microtubules leading to neurodegeneration.
- The plant based carbon nanomaterial (CNM) may target the cross-interaction.
- CNM has anti-oxidant and anti-inflammatory properties reducing the severity of AD.
- CNM due to high bioavailability and low toxicity make them a potential therapeutic candidate.

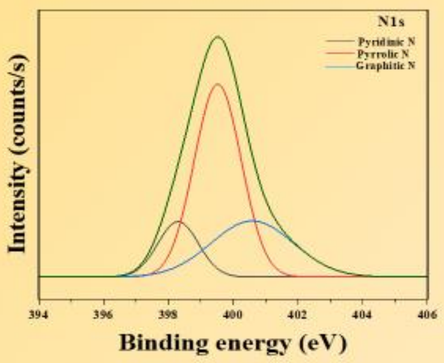
Introduction

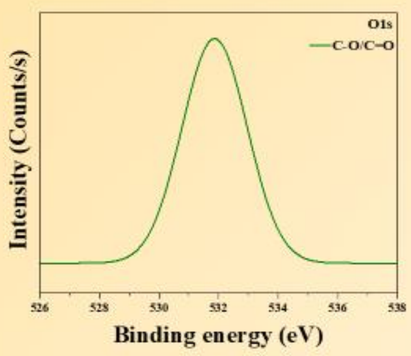
- For the therapeutics by targeting pathological proteins in Alzheimer, Carbon Dots (CDs) are synthesized.
- CDs can cross Blood Brain Barrier reaching the targeted site.
- Fluorescent property of CDs enable them to use as an imaging agent for amyloid plaques and tau tangles.
- The CD derived from plant can be conjugated with bioactive compound in future for enhanced activity.

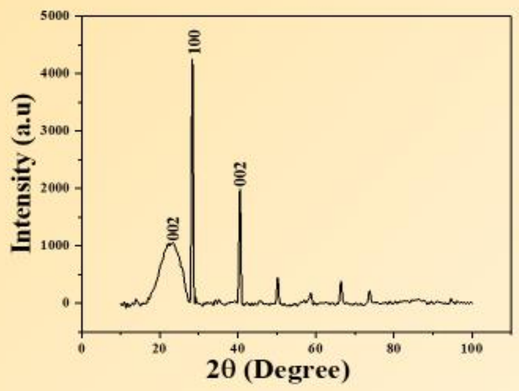
Design/Other information



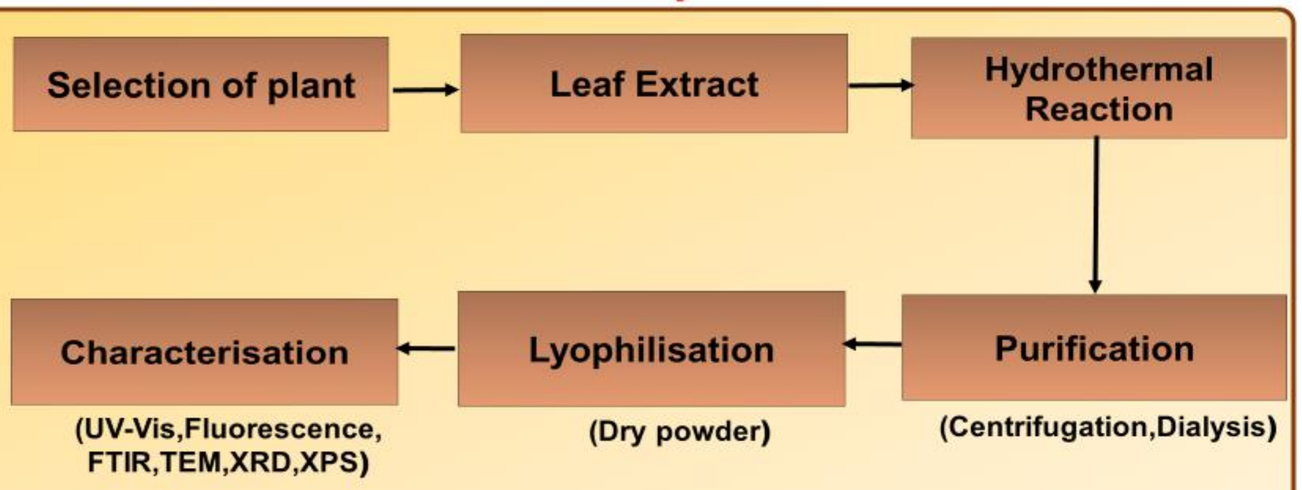




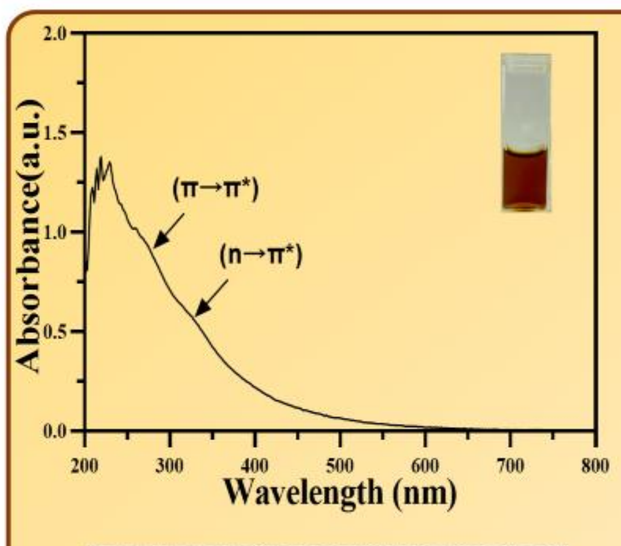


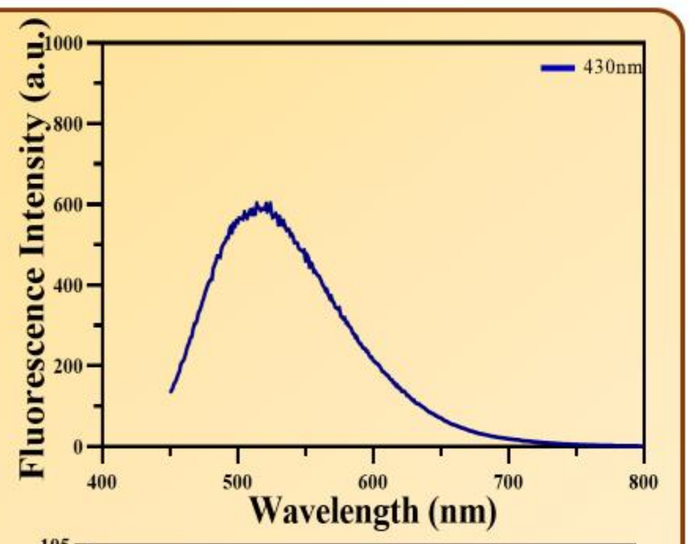


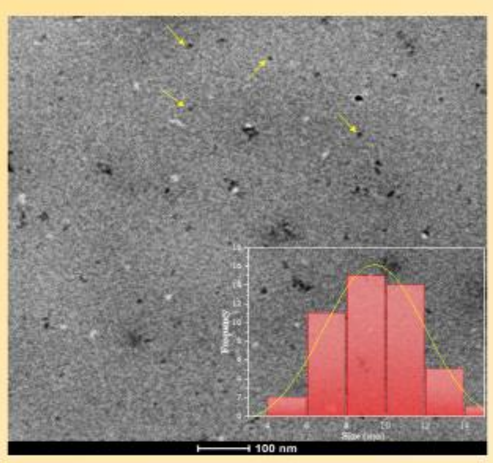
Set up

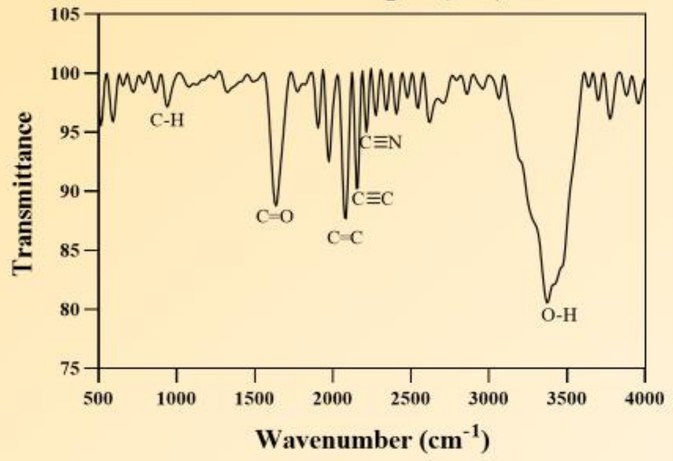


Results









Conclusions

- After characterization studies, the synthesis of carbon dot is successful.
- The maximum fluorescence emission is observed at 515 nm with an excitation of 430 nm.
- The absorbance so obtained is at 280 nm and 340 nm.
- The TEM size of Carbon dot is ~ 9.4nm.

References

- Shukla, A. K., Sharma, C., & Acharya, A. (2021). Bioinspired metal-free fluorescent carbon nanozyme with dual catalytic activity to confront cellular oxidative damage. *ACS Applied Materials & Interfaces*, *13*(13), 15040-15052.
- Walia, S., Shukla, A. K., Sharma, C., & Acharya, A. (2019). Engineered bright blue-and red-emitting carbon dots facilitate synchronous imaging and inhibition of bacterial and cancer cell progression via 1O2-mediated DNA damage under photoirradiation. *ACS Biomaterials Science & Engineering*, *5*(4), 1987-2000.

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