

Chapter 5

Conclusions and Future Scope



Conclusion and Scope of future work

- ✓ Activated carbons were prepared from palm shell powder using a combination of physicochemical activation techniques. Attempts were made to use the less explored persulphate for chemical activation.
- ✓ All the prepared carbons had almost equal number of mesopores and micropores
- ✓ The potential of the prepared activated carbons has been investigated for the removal of Bisphenol-A, 4-Chlorophenol, 4-nitrophenol, 2,4-Dinitrophenol 2,4,6-Trinitrophenol and Monocrotophos.
- ✓ The adsorption process followed pseudo second order and elovich kinetics and – Langmuir and Freundlich isotherm models.
- ✓ The ACs used in this study had high adsorption capacity for the model pollutants under study which was largely attributable to dispersion, hydrogen bonding and electrostatic adsorbent-adsorbate interactions.
- ✓ The silver nanoparticle loaded activated carbons have been synthesized using SPAC, PSAC, PCAC and PAC.
- ✓ The as-prepared AgACs were used as effective catalysts for the reduction of nitrophenols to aminophenols from aqueous solutions.
- ✓ The catalysts also exhibited recyclability upto upto five, four, three and four cycles for Ag-PSAC, Ag-PSAC, Ag-PCAC and Ag-PAC respectively for the reduction of 4-NP to 4-AP.
- ✓ The Ag-PCAC also showed potential to act as SERS substrate for 4- NP.
- ✓ CQDs and GQDs were fabricated by chemical exfoliation of triflic acid activated PSP and by hydrothermal treatment of DTPA respectively, which are rich in distributed graphitic domains.
- ✓ The strategy of using triflic acid for the preparation of CQDs and the use of DTPA as precursor for the synthesis of multilayered GQDs has been attempted for the first time.
- ✓ The CDs and GQDs emitted strong and stable green and blue fluorescence respectively that was selectively and efficiently quenched by Nitrocompounds as compared to other pollutants such as 4-Chlorophenol, Monocrotophos and Phenol and hence was effective in sensing NPs (4-nitrophenol, 2,4-Dinitrophenol 2,4,6-Trinitrophenol).

- ✓ The GQDs could be effectively reused five times when used as sensor for 11.11 mM of 4-NP after treating the used GQDs with ethyl acetate.
- ✓ The efficiency of both CQDs and GQDs were comparable with other quantum dots based sensors reported in literature.

Scope of future work

- The presence of both micropores and mesopores in significant amounts make them ideal as materials for supercapacitor electrodes. They can have high capacitance at both high current and low current densities. Investigations in this direction would be interesting.
- The suitability of Ag-PCAC as SERS substrates is very attractive and needs to be further investigated in detail.
- Further investigations need to be done to understand the loss of catalytic activity of Ag-ACs under study. The study of surface morphology by TEM would be useful in this regard.
- The adsorbents, catalysts and sensors developed in this investigation have to be applied to practical samples to establish further their feasibility