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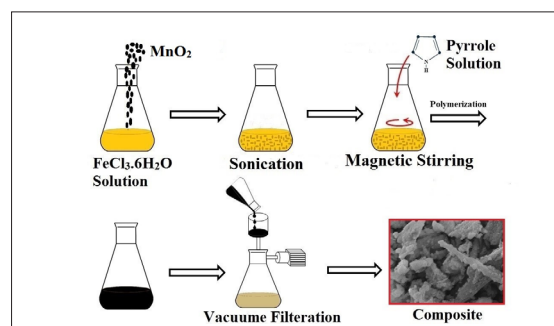
Polypyrrole/MnO₂ composites: Synthesis, characterization and analytical applications

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Synthesis, characterization and analytical applications of polypyrrole (PPy)-MnO₂ composites is presented herein. PPy and its composites were synthesized in the aqueous medium by a modified chemical oxidation polymerization method using ferric chloride as an oxidant. The materials were characterized by FT-IR, XRD, TGA, UV-visible, SEM and EDX spectroscopic and analytical techniques. The FT-IR results confirmed the successful synthesis of PPy and PPy/MnO₂ composites with amorphous and crystalline structures, respectively and enhanced thermal stability in case of composites. The SEM and EDX data showed the porous nature of the materials with desired elemental composition. The BET surface area was also determined and found to increase with the increase of MnO₂ content in the composites. The UV-visible spectral analysis confirmed the doping of PPy in composites and found the decrease in the energy band gap values with the increase of MnO₂ content in the composites. The analytical applications such as electrical and gas sensing of the synthesized materials were also determined using LCR-meter. The results showed the semiconducting behavior of the materials where the resistance is dependent on temperature and MnO₂ content of the composites. The gas sensing behavior of the materials showed high selectivity and sensitivity towards NH₃ using 1 to 30 ppm concentration with 0.4 ppm LOD at 25 °C. The sensitivity, response and recovery times of the materials were also determined.



References

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Recent Publications

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Biography

Hamayun Khan has completed his PhD in Chemistry/Chemical Engineering from Kyungpook National University, Republic of Korea. Currently, he is working as an Associate Professor, Department of Chemistry, Islamia College University, Pakistan and taught Analytical Chemistry as major subject. His fields of interests are environmental and bio analytical chemistry, material chemistry, separation science and technology, wastewater treatment, resource recycling and waste management. He has published one Korea patent, one chapter in book and more than 50 papers in reputed journals. He has served as the Director Academics and ORIC of Islamia College University, Peshawar, Pakistan.

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