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Spectroscopic investigations upon 100MeV oxygen ions irradiation on polyaniline and poly-o-toluidine

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Conducting polymers are the materials been extensively studied in the field of organic devise applications. The extended π-orbital which enables electron to move from one to another end of polymer made it flexible in tailoring different properties and therefore are known to be the considerably attractive materials. Here in this report Polyaniline (PANI) and Poly-o-toluidine (PoT) the derivative of PANI where one hydrogen atom of main polymer chain is substituted with the methyl group are studied upon irradiation with 100MeV oxygen ions irradiation at different fluences. PANI and PoT consist of interesting properties viz. electrochemical and optical properties, moderate conductivity, as well as environmental stability, may be applicable to the chemical sensing applications. Swift Heavy Ions (SHI) irradiation is the exclusively applied tool in detrimental modifications of solid materials. The effects of SHI irradiation on PANI and PoT were studied using UV – Vis spectroscopy and Raman spectroscopy. The band gap studies were done with Tauc plot calculations.

Topics

Band gap, Optical properties, Chemical elements, Polymers, Raman spectroscopy, Visible spectroscopy

REFERENCES

1. S.B. Kadam, K. Datta, P. Ghosh, A.B. Kadam, P.W. Khirade, V. Kumar, R.G. Sonkawade, A.B. Gambhire, M.K. Lande, M.D. Shirsat, *Appl Phys A* (2010) 100: 1083–1088 https://doi.org/10.1007/s00339-010-5705-1 Google Scholar Crossref

2. P Ghosh, K Datta, A Mulchandani, R G Sonkawade, K Asokan,Mahendra D Shirsat, *Smart Mater. Struct.* 22 (2013) 035004 (8pp). https://doi.org/10.1088/0964-1726/22/3/035004 Google Scholar Crossref

3. Mahendra D. Shirsat, Mangesh A. Bangar, Marc A. Deshusses, Nosang V. Myung, and Ashok Mulchandani, *Applied Physics Letters* 94, 083502 (2009) https://doi.org/10.1063/1.3070237 Google Scholar Crossref

4. K Datta, P Ghosh, M A More, M D Shirsat and A Mulchandani, *Journal Of Physics D: Applied Physics*, doi: https://doi.org/10.1088/0022-3727/45/35/355305

5. Mahendra D. Shirsat, Chee O. Too and Gordon G. Wallace, *Electroanalysis*, 20, (2008), no. 2, 150 –156 https://doi.org/10.1002/elan.200704028 Google Scholar Crossref

6. D J Shirale,V K Gade, P D Gaikwad, P A Savale, K P Kakde, H J Kharat and M D Shirsat, *International Journal of Polymer Analysis and Characterization*, 11, 5, (2006) Google Scholar Crossref

7. Md. Aminur Rahman, Pankaj Kumar, Deog-Su Park and Yoon-Bo Shim, *Sensors* 2008, 8, 118–141 https://doi.org/10.3390/s8010118 Google Scholar Crossref PubMed

8. Harshada K. Patil, Megha A. Deshmukh, Sumedh D. Gaikwad, Gajanan A. Bodkhe, K. Asokan, Mikito Yasuzawa, Pankaj Koinkar, Mahendara D. Shirsat, *Radiation Physics and Chemistry* 130 (2017) 47–51 https://doi.org/10.1016/j.radphyschem.2016.07.030 Google Scholar Crossref

9. P Ghosh, K Datta, A Mulchandani, R G Sonkawade, K Asokan and Mahendra D Shirsat, *Smart Mater. Struct.* 22 (2013) 035004 (8pp)
https://doi.org/10.1088/0964-1726/22/3/035004
Google Scholar Crossref

10. S. B. Kadam, K. Datta, P. Ghosh, A. B. Kadam, P.W. Khirade, V. Kumar, R. G. Sonkawade, A. B. Gambhire, M. K. Lande, M. D. Shirsat, *Appl Phys A* (2010) 100: 1083–1088
https://doi.org/10.1007/s00339-010-5705-1
Google Scholar Crossref

11. William J. Weber, Dorothy M. Duffy, Lionel Thomé, Yanwen Zhang, *Current Opinion in Solid State and Materials Science* 19 (2015) 1–11
https://doi.org/10.1016/j.cossms.2014.09.003
Google Scholar Crossref

12. Subhash Chandra, S Annapoorni, R G Sonkawade, P K Kulriya, Fouran Singh, D K Avasthi, J M S Rana, R C Ramola, *Indian J. Phys.* 83 (7), 943–947 (2009)
https://doi.org/10.1007/s12648-009-0052-9
Google Scholar Crossref

13. A. Kumar, Somik Banerjee, *Adv. Mat. Lett.* 2013, 4(6), 433–437 https://doi.org/10.5185/amlett.2012.ib.109
Google Scholar Crossref

14. Jayanta Hazarika, Chandrani Nath and A. Kumar, *Radiation Effects & Defects in Solids*, 2014 vol. 169, no. 1, 30–40 https://doi.org/10.1080/10420150.2013.826218
Google Scholar Crossref

15. S. Pruneanu, E. Veress, I. Marian, L. Oniciu, *Journal of Materials Science* 34 (1999) 2733 –2739
https://doi.org/10.1023/A:1004641908718
Google Scholar Crossref

16. Yasir Ali, R.G. Sonkawade, A.S. Dhaliwal, *Nuclear Instruments and Methods in Physics Research B* 316 (2013) 42–47 https://doi.org/10.1016/j.nimb.2013.08.033
Google Scholar Crossref