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‹ Back to results | 1 of 1

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Tea from the drinking to the synthesis of metal complexes and fabrication of PVA based polymer composites with controlled optical band gap (Article)

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Abstract

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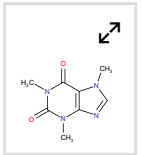
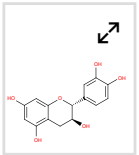
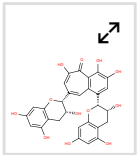
In the present study black tea extract (BTE) solution which is familiar for drinking was used to prepare cerium metal-complexes (Ce(III)-complex). The prepared Ce(III)-complex was characterized by Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), and UV–Vis spectroscopy. The results indicate that BTE solution is a novel green coordination chemistry approach for the synthesis of metal complexes. The outcomes signify that coordination occurs between cerium cations and polyphenols. The synthesis of metal-complexes with superior absorption performance in the visible region is a challenge for optoelectronic device applications. The suspended Ce(III)-complex in distilled water was mixed with poly (vinyl alcohol) (PVA) polymer to fabricate PVA/ Ce(III)-complex composites with controlled optical properties. The PVA/Ce(III)-complexes composite films were characterized by FTIR, XRD, and UV–Vis spectroscopy. The XRD findings confirms the amorphous structure for the synthesized Ce(III)-complexes. The addition of Ce(III)-complex into the PVA host polymer led to the growth of polymer composites with controllable small optical band gaps. It is shown by the FTIR spectra of the composite films that the functional groups of the host PVA have a vigorous interaction with the Ce(III)-complex. The XRD deconvolution on PVA composites reveals the amorphous phase enlargement with increasing Ce(III)-complex concentration. It is indicated in the atomic force microscopy (AFM) that the surface roughness in the doped PVA films increases with the increase of the Ce(III)-complex. There is a decrease in absorption edge from 5.7 to 1.7 eV. It becomes possible to recognize the type of electron transition by studying both the Tauc's model and optical dielectric loss (ε_i) parameter.

Chemistry database information

Substances

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References (87)

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1 Li, S., Lo, C.-Y., Pan, M.-H., Lai, C.-S., Ho, C.-T.
Black tea: Chemical analysis and stability

(2013) *Food and Function*, 4 (1), pp. 10-18. Cited 110 times.
doi: 10.1039/c2fo30093a

View at Publisher

2 Drynan, J.W., Clifford, M.N., Obuchowicz, J., Kuhnert, N.
The chemistry of low molecular weight black tea polyphenols

(2010) *Natural Product Reports*, 27 (3), pp. 417-462. Cited 96 times.
doi: 10.1039/b912523j

View at Publisher

3 Van Der Hooft, J.J.J., Akermi, M., Ünlü, F.Y., Mihaleva, V., Roldan, V.G., Bino, R.J., De Vos, R.C.H., (...), Vervoort, J.
Structural annotation and elucidation of conjugated phenolic compounds in black, green, and white tea extracts

(2012) *Journal of Agricultural and Food Chemistry*, 60 (36), pp. 8841-8850. Cited 58 times.
doi: 10.1021/jf300297y

View at Publisher

4 Hayat, K., Iqbal, H., Malik, U., Bilal, U., Mushtaq, S.
Tea and Its Consumption: Benefits and Risks

(2015) *Critical Reviews in Food Science and Nutrition*, 55 (7), pp. 939-954. Cited 91 times.
www.tandf.co.uk/journals/titles/10408398.asp
doi: 10.1080/10408398.2012.678949

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