IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, June 2023

Fabrication and Corroboration of Cupric Chloride Nanoparticles with Tetrabutylammonium Bromide (TBAB) – Itaconic Acid Based Deep Eutectic Solvent (DES)

Priyanka Sharma and Abhay Sawant
Ramniranjan.Jhunjhunwala. College of Arts, Science, and Commerce, Ghatkopar, Mumbai, India

Abstract: *Deep Eutectic Solvents (DES), as a new class of green solvents, have achieved attentiveness inthe last twenty years because of their stupendous applicability in technological processes, their preparation simplicity, and their high bioadsorbility and benign nature towards environment. Recently, DESs have been found as a multipurpose media to synthesize a wide range of inorganic nanomaterials. This present work summarizes the application of tetrabutylammonium bromide (TBAB)-itaconic acid based DES as environmentally benign medium to synthesize cupricchloride nanoparticles at low cost and in easy steps. The upgrade reaction conditions to prepare cupric chloride nanoparticles were mixing copper chloride, (5R)-[(1S)-1,2-Dihydroxyethyl]-3,4-dihydroxyfuran-2(5H)-one, and TBAB-itaconic acid based DES for 1 hour and 30 minutes at ambient temperature in the accompany of polyvinylpyrrolidone (PVP). Characterization of prepared samples using FE-SEM - field emission scanning electronmicroscopy , EDX - energy dispersive x-ray analysis , and TEM- transmission electron microscopy showed that cupric chloride nanoparticles obtained are of size in the rangeof 11nm to 29 nm.*

Keywords: Cupric chloride nanoparticles, FE-SEM, TEM, EDX, TBAB-itaconic acid based deep eutectic solvent (DES)

REFERENCES

[1] P. Zijlstra, M. Orrit, Reports on Progress in Physics, 74 (2011) 106401.
[2] A. Kamyshny, J. Steinke, S. Magdassi, Open Applied Physics J., 4 (2011) 19.
[3] R. Gréget, G.L. Nealon, B. Vileno, P. Turek, C. Mény, F. Ott, A. Derory, E. Voirin
[4] E. Rivière, A. Rogalev, ChemPhysChem, 13 (2012) 3092.
[5] R.R. Letfullin, C.B. Iversen, T.F. George, Nanomedicine: Nanotech., Bio. and Med., 7 (2011) 137.
[6] Veena Wenqing Xu, Mohammed Zahedul Islam Nizami,* Iris Xiaoxue Yin, Ollie Yiru Yu, Christie Ying Kei Lung, and Chun Hung Chu Application of Copper Nanoparticles in dentistry, Nanomaterials (Basel). 2022 Mar; 12(5): 805. Published online 2022 Feb 27. doi: 10.3390/nano12050805
[7] C. Roos, M. Schmidt, J. Ebenhoch, F. Baumann, B. Deubzer, and J. Weis, Advanced Materials, vol. 11, no. 9, pp. 761–766, 1999.
[8] R. G. Freeman, M. B. Hommer, K. C. Grabar, M. A. Jackson, and M. J. Natan, Journal of Physical Chemistry, vol. 100, no. 2, pp. 718–724, 1998.
[9] L. Cao, P. Diao, L. Tong, T. Zhu, and Z. Liu, ChemPhysChem, vol. 6, no. 5, pp. 913–918, 2005.
[10] Heon Lee , Sung Hoon Park , Seong-Gyu Seo , Sun-Jae Kim , Sang-Chai Kim , Young- Kwon Park and Sang-Chul Jung, Current Nanoscience, 2014, 10, 7-10
[11] Tan S., Ebrahimi A., Liu X., Langrish T. Role of Templating Agents in the Spray Drying and Postcrystallization of Lactose for the Production of Highly Porous Powders. Dry.Technol. 2018;36:1882–1891. doi: 10.1080/07373937.2018.1445096

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, June 2023

[12] Li Y., Khuu N., Prince E., Alizadehgiashi M., Galati E., Lavrentovich O.D., Kumacheva E. Nanoparticle-Laden Droplets of Liquid Crystals: Interactive Morphogenesis and Dynamic Assembly. Sci. Adv. 2019;5:eaav1035. doi: 10.1126/sciadv.aav1035.
[13] Holmberg K. Surfactant-Templated Nanomaterials Synthesis. J. Colloid Interface Sci. 2004;274:355–364. doi: 10.1016/j.jcis.2004.04.006.
[14] Abbott, Andrew P.; Capper, Glen; Davies, David L.; Munro, Helen L.; Rasheed, Raymond K.; Tambyrajah, Vasuki (2001). Preparation of novel, moisture-stable, Lewis-acidic ionic liquids containing quaternary ammonium salts with functional side chains. Chemical Communications, (19), 2010–2011.
[15] C. Russ, B. Kçnig, Green Chem. 2012, 14, 2969 – 2982
[16] A. P. Abbott, D. Boothby, G. Capper, D. L. Davies, R. K. Rasheed, J. Am. Chem. Soc. 2004, 126, 9142 – 9147.
[17] Cooper ER, Andrews CD, Wheatley PS, Webb PB, Wormald P, Morris RE. Ionic liquids and eutectic mixtures as solvent and template in synthesis of zeolite analogues. Nature 2004, 430, 1012– 1016.
[18] Oseguera-Galindo DO, Machorro-Mejia R, Bogdanchikova N, Mota-Morales JD (2016) Silver nanoparticles synthesized by laser ablation confined in urea choline chloride deep eutectic solvent.
Colloid Interface Sci Commun 12:1–4
[19] Renjith A, Lakshminarayanan V (2015) One step preparation of 'ready to use' Au@Pd nanoparticles modified surface using deep eutectic solvents and a study of its electrocatalytic properties in the methanol oxidation reaction. J Mater Chem A 3:3019–3028.
[20] Zhang JM, Sun SN, Li Y, Zhang XJ, Zhang PY, Fan YJ (2017) A strategy in deep eutectic solvents for carbon nanotube-supported Pt Co nanocrystallites with enhanced performance towards methanol electrooxidation. Int J Hydrogen Energy 42:26744–26751
[21] Qu Q, Tang W, Tang B, Zhu T (2017) Highly selective purification of ferulic acid from wheat bran using deep eutectic solvents modified magnetic nanoparticles. Sep Sci Technol 52:1022–1030.
[22] Martis P, Dilimon VS, Delhalle J, Mekhalif Z (2010) Electro-generated nickel/carbon nanotube composites in ionic liquid. Electrochim Acta 55:5407–5410
[23] Gutierrez MC, Rubio F, del Monte F (2010) Resorcinol-formaldehyde polycondensation in deep eutectic solvents for the preparation of carbon and carbon-carbon nanotube composites. Chem Mater 22:2711–2719.
[24] Qurejeta-Fernández A, Hernández-Garrido JC, Yang H, Zhou Y, Varela A, Parras M, Calvino- Gámez JJ, González-Calbet JM, Green PF, Kotov NA. Unknown aspects of self-assembly of PbS microscale superstructures. ACS Nano. 2015, 6, 3800–3812.
[25] Liu W, Yu Y, Cao L, Su G, Liu X, Zhang L, Wang Y. Synthesis of monoclinic structured BiVO4 spindly microtubes in deep eutectic solvent and their application for dye degradation. J. Hazard. Mater. 2010, 181, 1102–1108.
[26] Dong JY, Hsu YJ, Wong DSH, Lu SY. Growth of ZnO nanostructures with controllable morphology using a facile green antisolvent method. J. Phys. Chem. C 2010, 114, 8867–8872.
[27] Gallego I, Grover MA, Hud NV. Folding and imaging of DNA nanostructures in anhydrous and hydrated deep-eutectic solvents. Angew. Chem., Int. Ed. 2015, 54, 6765–6769.
[28] Wagle DV, Zhao H, Baker GA (2014) Deep eutectic solvents: sustainable media for nanoscale and functional materials. Acc Chem Res 47:2299–2308 294.
[29] Abo-Hamad A, Hayyan M, AlSaadi MA, Hashim MA (2015) Potential applications of deep eutectic solvents in nanotechnology. Chem Eng J 273:551–567.
[30] Zheng, Q. W., and R. M. Hua. 2010. CuCl-catalyzed cycloaddition of 1,3-butadiynes with primary amines: an atom-economic process for synthesis of 1,2,5-trisubsituted pyrroles. Tetrahedron Letters 51: 4512–4514.
[31] Leyva-Pe´rez, A., J. A. Vidal-Moya, C. Cabrero-Antonino, S. S. Al-Deyab, S. I. Al-Resayes, and A. Corma. 2011. Copper(I)- catalyzed hydrophosphination of styrenes. Journal of Organometallic Chemistry 696: 362–367.
[32] Casolari, R., F. Felluga, V. Frenna, F. Ghelfi, U. M. Pagnoni, A. F. Parsons, and D. Spinelli. 2011. A green way to c-lactams through a copper-catalyzed ARGET-ATRC in ethanol and in the presence of ascorbic acid. Tetrahedron 67: 408–416.
[33] Priyanka Sharma, Abhay Sawant, "Synthesis and Characterization of a Deep Eutectic Solvent with Tetrabutylammonium bromide (TBAB) and Itaconic Acid" International Journal of All Research Education and

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, June 2023

Scientific Methods (IJARESM), ISSN: 2455-6211 Volume 11, Issue 2, 2023, doi: https://doi.org/11.56025/ijaresm.2023.112231006

[34] Ying Huang, Fei Shen, Jing La, Genxiang Luo, Junling Lai, Chunsheng Liu, and Gang Chu, 2013