

OPTIMIZATION FOR FLAT NORMAL DISPERSION IN A SUSPENDED-CORE FIBERS INFILTRATED WITH WATER

Bien Chu Van*¹, An Manh Nguyen¹, Hieu Le Van¹, Van Cao Long², Quang Ho Dinh³.

¹Department of Physics, Hong Duc University, 565 Quang Trung Street, Thanh Hoa City, Vietnam;

²Institute of Physics, University of Zielona Góra, Prof. Szafrana 4a, 65-516 Zielona Góra, Poland;

³School of Chemistry, Biology and Environment, Vinh University, 182 Le Duan Street, Vinh City, Vietnam;

E-mail: chuvanbiendhhd@yahoo.com

Abstract. In this paper we present a study on the dispersion characteristics in a suspended-core As_2S_3 chalcogenide microstructure optical fiber infiltrated with water at mid-infrared wavelength range. Replacement of air with water results in dramatic improvement of the dispersion characteristics in the fiber, valuable in the process of supercontinuum generation. As a results, a near-zero flat dispersion can be achieved in the anomalous or normal dispersion range for various diameter of the core.

Key word: *Suspended-core, Dispersion, supercontinuum generation, liquids.*

REFERENCES

- [1] L. Dong, B.K. Thomas, L. Fu, *Opt. Express* 16 (21), 2008, 16423–16430.
- [2] A. Yu. Chamorovskiy, S.A. Nikitova, *J. Commun. Technol. Electron.* 58 (9), 2013, 879–890.
- [3] Dudley, G. Genty, and S. Coen, *Rev. Mod. Phys.* 78 (4), 2006, 1135–1184.
- [4] Agrawal, G. P., *Nonlinear Fiber Optics*, 4th edition (2007) 978-0-12-369516-1.
- [5] T. M. Monro, W. Belardi, K. Furusawa, J. C. Baggett, N. G. R. Broderick, and D. J. Richardson, *Meas. Sci. Technol.* 12(7), 2001, 854–858.
- [6] S. T. Cundiff and J. Ye, *Rev. Mod. Phys.* 75(1), 2003, 325–342.
- [7] M. J. Thorpe, D. D. Hudson, K. D. Moll, J. Lasri, and J. Ye, *Opt. Lett.* 32(3), 2007, 307–309.
- [8] Agrawal G P, *Nonlinear Fiber Optics* 5th edn , 2013(Oxford: Academic Press).
- [9] Stepniewski G, Klimczak M, Bookey H, Siwicki B, Pysz D, Stepień R, Kar A K, Waddie A J, Taghizadeh M R and Buczyński R, *Laser Phys. Lett.* 11, 2014, 055103.
- [10] A. Schliesser, N. Picque, and T. W. Hansch, *Nat. Photonics* 6, 2012, 440–449.
- [11] R. Wilson and H. Tapp, *TRAC-Trend. Anal. Chem.* 18, 1999, 85–93.
- [12] B. Guo, Y. Wang, C. Peng, H. Zhang, G. Luo, H. Le, C. Gmachl, D. Sivco, M. Peabody, and A. Cho, *Opt. Express* 12, 2014, 208–219.
- [13] P. Domachuk, N. A. Wolchover, M. Cronin-Golomb, A. Wang, A. K. George, C. M. B. Cordeiro, J. C. Knight, and F. G. Omenetto, *Opt. Express* 16, 2008, 7161–7168.
- [14] G. Qin, X. Yan, C. Kito, M. Liao, C. Chaudhari, T. Suzuki, and Y. Ohishi, *Appl. Phys. Lett.* 95, 2009, 161103.
- [15] C. Xia, Z. Xu, M. N. Islam, F. L. Terry, M. J. Freeman, A. Zakel, and J. Mauricio, *IEEE J. Sel. Top. Quant.* 15, 2009, 422–434.
- [16] Buczyński R, Bookey H T, Pysz D, Stepień R, Kujawa I, McCarthy J E, Waddie A J, Kar A K and Taghizadeh M, *Laser Phys. Lett.* 7, 2010, 666–72.
- [17] B. J. Eggleton, B. Luther-Davies, and K. Richardson, *Nat. Photonics* 5, 2011, 141–148.
- [18] Lumerical Solutions, Inc. <http://www.lumerical.com/tcad-products/mode/>.
- [19] Web page: Refractive Index Info: <https://refractiveindex.info>.
- [20] N.P. Barnes, M.S. Piltch, *Opt. Soc. A* 67 (5), 1977, 628.