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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel) : Transversely Excited Atmospheric CO_2 Laser-Induced Plasma Spectroscopy for the Detection of Heavy Metals in Soil
Nama/ Jumlah Penulis : 4 Orang
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Identitas Jurnal Ilmiah :
a. Nama Jurnal : Journal of Applied Spectroscopy
b. Nomor ISSN : 00219037, 15738647
c. Vol, No., Bln Thn : Vol. 84, No. 6, Januari 2018
d. Penerbit : Springer US
e. DOI artikel (jika ada) : 10.1007/s10812-018-0595-7
f. Alamat web jurnal : https://www.springer.com/journal/10812
Alamat Artikel : https://link.springer.com/article/10.1007/s10812-018-0595-7
g. Terindex : Scopus

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Total = (100%)	**40**			**36,50**
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Semarang, 20 April 2021
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Prof. Dr. Suryono, S.Si., M.Si.
NIP. 197306301998021001
Unit Kerja : Fisika
Bidang Ilmu: Fakultas Sains dan Matematika

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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
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Judul Karya Ilmiah (Artikel) : Transversely Excited Atmospheric CO_2 Laser-Induced Plasma Spectroscopy for the Detection of Heavy Metals in Soil

Jumlah Penulis : 4 orang

Status Pengusul : Penulis pertama/ ~~Penulis ke-~~ / ~~Penulis Korespondesi~~ **

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d.	Penerbit	: Springer US
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d. Kelengkapan unsur dan kualitas penerbit (30%)	11,2	11,3	11,25
Total = (100%)			36,85
Nilai untuk Pengusul : (60% x 36,85) = 22,11			

Semarang, 24 Februari 2021

Reviewer 1

Prof. Dr. Suryono, S.Si., M.Si.
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Reviewer 2

Dr. Eng. Eko Hidayanto, S.Si., M.Si.
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Bidang ilmu/Unit kerja : Fakultas Sains dan Matematika/Fisika

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b. Ruang lingkup dan kedalaman pembahasan (30%)	12			11,4
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	12			11,3
d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12			11,3
Total = (100%)	**40**			**39,5**
Nilai Pengusul = 60% x 39,5 = 22,32				

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1. **Kesesuaian dan kelengkapan unsur isi jurnal:**
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2. **Ruang lingkup dan kedalaman pembahasan:**
   Paper ini membahas tentang proses deteksi cepat logam berat di tanah dengan metode plasma gas menggunakan laser CO2 atmosferik transversal tereksitasi (TEA).
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
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Bidang Ilmu: Fakultas Sains dan Matematika

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Journal of Applied Spectroscopy • Volume 84, Issue 6, Pages 1108 - 1113 • 1 January 2018

Transversely Excited Atmospheric CO_2 Laser-Induced Plasma Spectroscopy for the Detection of Heavy Metals in Soil

Khumaeni A.[a] ✉ , Sugito H.[a], Setia Budi W.[a], Yoyo Wardaya A.[a, b]

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[b] Master Program in Energy, School of Postgraduate Studies (SPS), Diponegoro University, Semarang, 50275, Indonesia

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A rapid detection of heavy metals in soil was presented by the metal-assisted gas plasma method using specific characteristics of a pulsed, transversely excited atmospheric (TEA) CO_2 laser. The soil particles were placed in a hole made of acrylic plate. The sample was covered by a to prevent the soil particles from being blown off. The mesh also functioned to initiate a luminous plasma. When a TEA CO_2 laser (1500 mJ, 200 ns) was focused on the soil sample, passing through the metal mesh, some of the laser energy was used to generate the gas plasma on the mesh surface, and the remaining laser energy was employed to ablate the soil particles. The fine, ablated soil particles moved into the gas plasma region to be dissociated and excited. Using this technique, analysis can be made with reduced sample pretreatment, and therefore a rapid analysis can be performed efficiently. The results proved that the signal to noise ratio (S/N) of the emission spectral lines is much better for the case of the present method (mesh method) compared to the case of standard laser-induced breakdown spectroscopy using the pellet method. Rapid detection of heavy metal elements in soil has been successfully carried out. The detection limits of Cu and Hg in soil were estimated to be 3 and 10 mg/kg, respectively. The present method has good potential for rapid and sensitive detection of heavy metals in soil samples. © 2018, Springer Science+Business Media, LLC, part of Springer Nature.

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Research Progress of Multi-Spectral Technique in the Determination of Soil Component Content | 多光谱技术在土壤成分含量检测中的研究进展
Li, X.-X. , Cao, S.-S. , Bai, X.-B.
(2020) Guang Pu Xue Yu Guang Pu Fen Xi/Spectroscopy and Spectral Analysis

Atomic Spectrometry Update-a review of advances in environmental analysis
Bacon, J.R. , Butler, O.T. , Cairns, W.R.L.
(2019) Journal of Analytical Atomic Spectrometry

Rapid identification of elements in liquid by using pulse carbon dioxide laser-induced plasma spectroscopy
Khumaeni, A. , Wardaya, A.Y. , Niki, H.
(2018) AIP Conference Proceedings

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(2020) Journal of Physics: Conference Series

Coarse Metal Powder-Assisted pulsed CO2 Laser-induced Breakdown Spectroscopy for the Direct Determination of Heavy Metals in Soil
Khumaeni, A. , Tani, M. , Kurihara, K.
(2017) Analytical Letters

Rapid identification of macro nutrients in pharmaceutical medicine using laser-induced plasma spectroscopy
Khumaeni, A. , Sugito, H. , Yoyo Wardaya, A.
(2018) Journal of Physics: Conference Series

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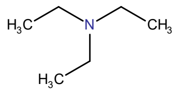

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References (27)

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☐ 1 Nanos, N., Martin, J.A.R.
(2012) *Geoderma*, pp. 554-562.

☐ 2 Zhang, Q., Ye, J., Chen, J., Xu, H., Wang, C., Zhao, M.
Risk assessment of polychlorinated biphenyls and heavy metals in soils of an abandoned e-waste site in China

(2014) *Environmental Pollution*, 185, pp. 258-265. Cited 120 times.
www.elsevier.com/inca/publications/store/4/0/5/8/5/6
doi: 10.1016/j.envpol.2013.11.003

View at Publisher

☐ 3 Liu, X., Song, Q., Tang, Y., Li, W., Xu, J., Wu, J., Wang, F., (...), Brookes, P.C.
Human health risk assessment of heavy metals in soil-vegetable system: A multi-medium analysis

(2013) *Science of the Total Environment*, 463-464, pp. 530-540. Cited 444 times.
doi: 10.1016/j.scitotenv.2013.06.064

View at Publisher

☐ 4 Li, Z., Ma, Z., van der Kuijp, T.J., Yuan, Z., Huang, L.
A review of soil heavy metal pollution from mines in China: Pollution and health risk assessment

(2014) *Science of the Total Environment*, 468-469, pp. 843-853. Cited 1445 times.
www.elsevier.com/locate/scitotenv
doi: 10.1016/j.scitotenv.2013.08.090

View at Publisher

☐ 5 Hutton, L.A., O'Neil, G.D., Read, T.L., Ayres, Z.J., Newton, M.E., MacPherson, J.V.

Electrochemical X-ray fluorescence spectroscopy for trace heavy metal analysis: Enhancing X-ray fluorescence detection capabilities by four orders of magnitude

(2014) *Analytical Chemistry*, 86 (9), pp. 4566-4572. Cited 54 times.
http://pubs.acs.org/journal/ancham
doi: 10.1021/ac500608d

View at Publisher

☐ 6 McComb, J.Q., Rogers, C., Han, F.X., Tchounwou, P.B.

Rapid screening of heavy metals and trace elements in environmental samples using portable X-ray fluorescence spectrometer, A comparative study (Open Access)

(2014) *Water, Air, and Soil Pollution*, 225 (12), art. no. 2169. Cited 53 times.
http://www.kluweronline.com/issn/0049-6979/
doi: 10.1007/s11270-014-2169-5

View at Publisher

☐ 7 Zhao, J., Yan, X., Zhou, T., Wang, J., Li, H., Zhang, P., Ding, H., (...), Ding, L.

Multi-throughput dynamic microwave-assisted leaching coupled with inductively coupled plasma atomic emission spectrometry for heavy metal analysis in soil

(2015) *Journal of Analytical Atomic Spectrometry*, 30 (9), pp. 1920-1926. Cited 20 times.
http://www.rsc.org/Publishing/Journals/JA/index.asp
doi: 10.1039/c5ja00233h

View at Publisher

☐ 8 Rifai, K., Laville, S., Vidal, F., Sabsabi, M., Chaker, M.

Quantitative analysis of metallic traces in water-based liquids by UV-IR double-pulse laser-induced breakdown spectroscopy

(2012) *Journal of Analytical Atomic Spectrometry*, 27 (2), pp. 276-283. Cited 72 times.
doi: 10.1039/c1ja10178a

View at Publisher

☐ 9 Cahoon, E.M., Almirall, J.R.

Quantitative analysis of liquids from aerosols and microdrops using laser induced breakdown spectroscopy

(2012) *Analytical Chemistry*, 84 (5), pp. 2239-2244. Cited 67 times.
doi: 10.1021/ac202834j

View at Publisher

☐ 10 Li, C.M., Zou, Z.M., Yang, X.Y., Hao, Z.Q., Guo, L.B., Li, X.Y., Lu, Y.F., (...), Zeng, X.Y.

Quantitative analysis of phosphorus in steel using laser-induced breakdown spectroscopy in air atmosphere

(2014) *Journal of Analytical Atomic Spectrometry*, 29 (8), pp. 1432-1437. Cited 32 times.
http://www.rsc.org/Publishing/Journals/JA/index.asp
doi: 10.1039/c4ja00036f

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Abstract

Author keywords

Reaxys Chemistry database information

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Funding details

☐ 11 Yaroshchyk, P., Death, D.L., Spencer, S.J.

Comparison of principal components regression, partial least squares regression, multi-block partial least squares regression, and serial partial least squares regression algorithms for the analysis of Fe in iron ore using LIBS

(2012) *Journal of Analytical Atomic Spectrometry*, 27 (1), pp. 92-98. Cited 64 times.
doi: 10.1039/c1ja10164a

View at Publisher

☐ 12 Myakalwar, A.K., Sreedhar, S., Barman, I., Dingari, N.C., Venugopal Rao, S., Prem Kiran, P., Tewari, S.P., (...), Manoj Kumar, G.

Laser-induced breakdown spectroscopy-based investigation and classification of pharmaceutical tablets using multivariate chemometric analysis (Open Access)

(2011) *Talanta*, 87 (1), pp. 53-59. Cited 101 times.
https://www.journals.elsevier.com/talanta
doi: 10.1016/j.talanta.2011.09.040

View at Publisher

☐ 13 Cahoon, E.M., Almirall, J.R.

Wavelength dependence on the forensic analysis of glass by nanosecond 266nm and 1064nm laser induced breakdown spectroscopy

(2010) *Applied Optics*, 49 (13), pp. C49-C57. Cited 33 times.
http://www.opticsinfobase.org/view_article.cfm?gotourl=http%3A%2F%2Fwww%2Eopticsinfobase%2Eorg%2FDirectPDFAccess%2F93072506%2D9E8B%2DDF1E%2DE0A0DDB711609F7E%5F196012%2Epdf%3Fda%3D1%26id%3D196012%26seq%3D0%26mobile%3Dno&org=Elsevier%20Inc
doi: 10.1364/AO.49.000C49

View at Publisher

☐ 14 Cremers, D.A., Radziemski, L.J.

Handbook of Laser-induced Breakdown Spectroscopy

(2006) *Handbook of Laser-induced Breakdown Spectroscopy*, pp. 1-283. Cited 1488 times.
http://onlinelibrary.wiley.com/book/10.1002/0470093013
ISBN: 978-047009299-6
doi: 10.1002/0470093013

View at Publisher

☐ 15 Miziolek, A.W., Palleschi, V., Schechter, I.

Laser induced breakdown spectroscopy (LIBS): Fundamentals and applications

(2006) *Laser Induced Breakdown Spectroscopy (LIBS): Fundamentals and Applications*, 9780521852746, pp. 1-620. Cited 1132 times.
http://dx.doi.org/10.1017/CBO9780511541261
ISBN: 978-051154126-1; 0521852749; 978-052185274-6
doi: 10.1017/CBO9780511541261

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☐ 16 Jantzi, S.C., Almirall, J.R.

Characterization and forensic analysis of soil samples using laser-induced breakdown spectroscopy (LIBS)

(2011) *Analytical and Bioanalytical Chemistry*, 400 (10), pp. 3341-3351. Cited 69 times.
doi: 10.1007/s00216-011-4869-7

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☐ 17 Burakov, V.S., Raikov, S.N., Tarasenko, N.V., Belkov, M.V., Kiris, V.V.

Development of a laser-induced breakdown spectroscopy method for soil and ecological analysis (review)

(2010) *Journal of Applied Spectroscopy*, 77 (5), pp. 595-608. Cited 28 times.
doi: 10.1007/s10812-010-9374-9

View at Publisher

☐ 18 Dell'Aglio, M., Gaudiuso, R., Senesi, G.S., De Giacomo, A., Zaccone, C., Miano, T.M., De Pascale, O.

Monitoring of Cr, Cu, Pb, v and Zn in polluted soils by laser induced breakdown spectroscopy (LIBS)

(2011) *Journal of Environmental Monitoring*, 13 (5), pp. 1422-1426. Cited 71 times.
doi: 10.1039/c0em00780c

View at Publisher

☐ 19 Ferreira, E.C., Gomes Neto, J.A., Milori, D.M.B.P., Ferreira, E.J., Anzano, J.M.

Laser-induced breakdown spectroscopy: Extending its application to soil pH measurements (Open Access)

(2015) *Spectrochimica Acta - Part B Atomic Spectroscopy*, 110, pp. 96-99. Cited 36 times.
http://www.elsevier.com/wps/find/journaldescription.cws_home/525437/description#description
doi: 10.1016/j.sab.2015.06.002

View at Publisher

☐ 20 Popov, A.M., Kozhnov, M.O., Zaytsev, S.M., Zorov, N.B., Labutin, T.A.

Enhanced Sensitivity of Direct Beryllium Determination in Soil by Laser-Induced Breakdown Spectrometry

(2015) *Journal of Applied Spectroscopy*, 82 (5), pp. 739-743. Cited 7 times.
https://rd.springer.com/journal/10812
doi: 10.1007/s10812-015-0173-1

View at Publisher

☐ 21 Khumaeni, A., Lie, Z.S., Lee, Y.I., Kurihara, K., Kagawa, K., Niki, H.

Rapid analyses of tiny amounts of powder samples using transversely excited atmospheric CO_2 laserinduced helium gas plasma with the aid of high-vacuum silicon grease as a binder on a metal subtarget

(2011) *Applied Spectroscopy*, 65 (2), pp. 236-241. Cited 16 times.
doi: 10.1366/10-06035

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☐ 22 Khumaeni, A., Niki, H., Fukumoto, K.-I., Deguchi, Y., Kurihara, K., Kagawa, K., Lee, Y.I.

A unique technique of laser-induced breakdown spectroscopy using transversely excited atmospheric CO_2 laser for the sensitive analysis of powder samples

(2011) *Current Applied Physics*, 11 (3), pp. 423-427. Cited 11 times.
doi: 10.1016/j.cap.2010.08.012

View at Publisher

☐ 23 Khumaeni, A., Lie, Z.S., Setiabudi, W., Kurniawan, K.H., Kagawa, K.

Food powder analysis by using transversely excited atmospheric CO_2 laser-induced plasma spectroscopy (Open Access)

(2015) *Journal of Physics: Conference Series*, 622 (1), art. no. 012057. Cited 2 times.
http://www.iop.org/EJ/journal/conf
doi: 10.1088/1742-6596/622/1/012057

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☐ 24 Ramli, M., Idris, N., Nikt, H., Kurniawan, K.H., Kagawa, K.

New method of laser plasma spectroscopy for metal samples using metastable He atoms induced by transversely excited atmospheric-pressure CO_2 laser in He gas at 1 atm

(2008) *Japanese Journal of Applied Physics*, 47 (3 PART 1), pp. 1595-1601. Cited 12 times.
http://jjap.ipap.jp/link?JJAP/47/1595/pdf
doi: 10.1143/JJAP.47.1595

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☐ 25 Khumaeni, A., Lie, Z.S., Niki, H., Lee, Y.I., Kurihara, K., Wakasugi, M., Takahashi, T., (...), Kagawa, K.

Comparative study of Nd:YAG laser-induced breakdown spectroscopy and transversely excited atmospheric CO_2 laser-induced gas plasma spectroscopy on chromated copper arsenate preservative-treated wood (Open Access)

(2012) *Applied Optics*, 51 (7), pp. B121-B129.
http://www.opticsinfobase.org/view_article.cfm?gotourl=http%3A%2F%2Fwww%2Eopticsinfobase%2Eorg%2FDirectPDFAccess%2F772FFDF2%2DAC63%2D5E90%2D74F6DE06B2577E8D%5F227976%2Epdf%3Fda%3D1%26id%3D227976%26seq%3D0%26mobile%3Dno&org=Elsevier%20Inc
doi: 10.1364/AO.51.00B121

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Emission characteristics of Ca and Mg atoms in gas plasma induced by the bombardment of transversely excited atmospheric CO_2 laser at 1 atm

(2012) *Japanese Journal of Applied Physics*, 51 (8 PART 1), art. no. 082403. Cited 6 times.
http://jjap.jsap.jp/link?JJAP/51/082403/pdf
doi: 10.1143/JJAP.51.082403

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☐ 27 Ingle, J.D., Crouch, S.R.
(1988) *Spectrochemical Analysis*. Cited 1344 times.
Prentice Hall, New Jersey

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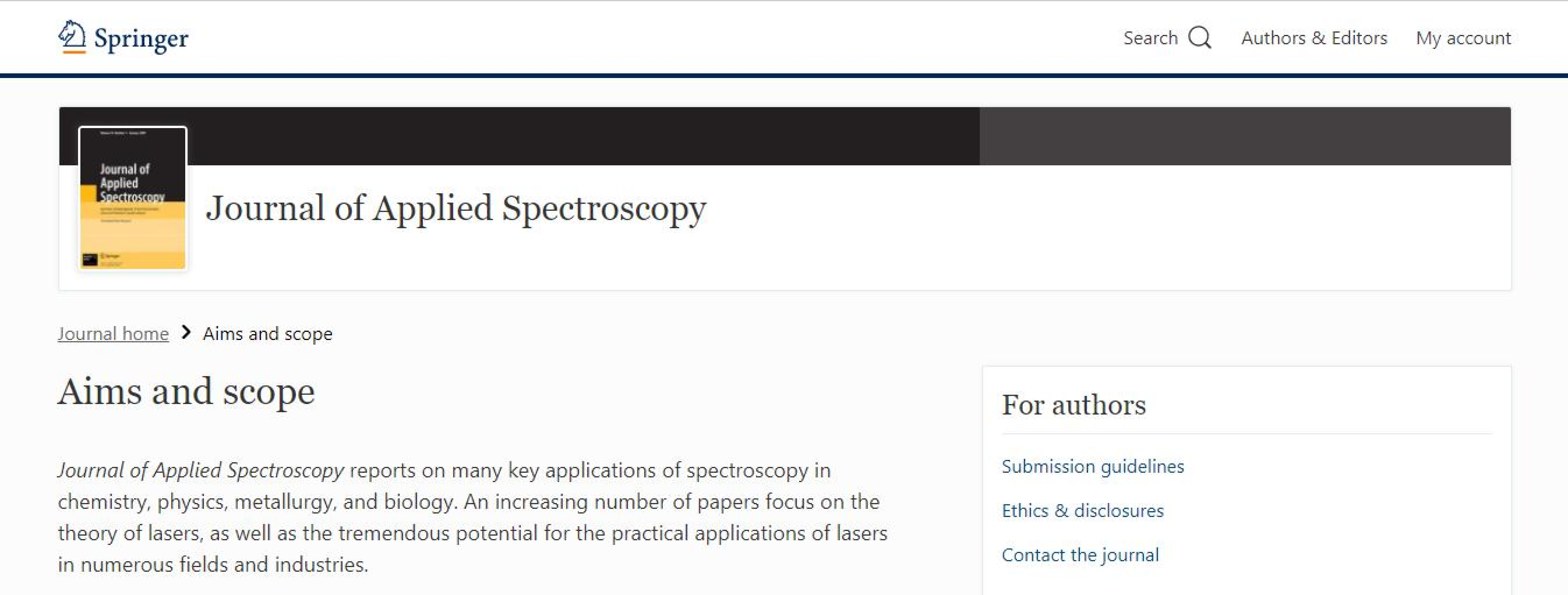

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RAMAN SPECTRA OF GRAPHENE SYNTHESIZED BY CHEMICAL VAPOR DEPOSITION FROM DECANE

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UDC535.375.5

Raman spectroscopy was used to study the structural properties of graphene synthesized by chemical vapor deposition using decane ($C_{10}H_{22}$) as a precursor at various hydrogen concentrations. Reduction of the carrier gas flow rate from 150 cm^3/min to zero changes the average spacing between the defects from 53 to 212 nm and the average grain size from 87 to 798 nm and changes the uniformity and continuity of the graphene layer. The obtained relationships can be used to control the defectiveness, homogeneity, and continuity of the graphene layer of the coating during synthesis by this method.

Keywords: graphene, chemical vapor deposition, decane, Raman spectroscopy, defect.

Introduction. The importance of research into graphene arises from its unique characteristics. Graphene is a promising material for various applications on account of its optical transparency, high mechanical strength, and thermal and electric conductivity [1–5]. It is at present being used in the production of field-effect transistors, biosensors, and transparent electrodes.

One of the most widely used methods of synthesis of graphene is chemical vapor deposition (CVD) [6–11]. By CVD it is possible to synthesize large areas of graphene that can then be transferred to other surfaces [12]. The synthesis of graphene with methane (CH_4) as precursor has been widely represented in the literature. The usual method of CVD synthesis of graphene on a catalyst substrate involves several stages [7] that depend to a significant degree on the type of precursor [11]. By using other hydrocarbons with different molecular mass as precursors it is possible to control the synthesis more effectively on account of change in the kinetics of growth of the graphene [11, 13].

Decane ($C_{10}H_{22}$) is a member of the homologous series of alkanes. In the present work the possibility of using it as precursor for the synthesis of graphene was investigated. We draw attention particularly to the following feature of the precursor. Thermal decomposition of decane is accompanied by the formation of $^*C_xH_y$ radicals [14], the presence of which in the gas mixture reduces the dissociation energy of the bond in the nitrogen molecule [15, 16]. This leads to a larger concentration of nitrogen atoms in the gas mixture compared with the process that only involves thermal decomposition of the nitrogen molecules (bond energy 226 kcal/mole). This feature makes it possible to dope the graphene with nitrogen during the synthesis processes with decane as precursor and nitrogen as carrier [17]. All this gives rise to the need to study the processes involved in the synthesis of graphene from decane.

Another important reagent in the synthesis of graphene is hydrogen, which is not only used for the reduction of copper oxide on the surface of the catalyst [18] but also has a direct effect on the formation of graphene. During the growth of graphene in the presence of hydrogen the latter is adsorbed on the surface of the copper [19, 20]. The adsorbed hydrogen atoms act as co-catalyst in the decomposition of the hydrocarbon [21], and at low concentrations of hydrocarbon in the absence of H_2 the endothermic decomposition reaction takes places slowly. Moreover, the hydrogen removes surplus layers of graphene from the substrate [21, 22]. At the same time negative effects from the use of hydrogen in the synthesis

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ACTIVITY, STABILITY, AND STRUCTURE OF NATIVE AND MODIFIED BY WOODWARD REAGENT K MUSHROOM TYROSINASE

S. Emami,[a] H. Piri,[b] and N. Gheibi[b]*

UDC 535.37:577.15

Mushroom tyrosinase (MT) was considered a good model for studying the inhibition, activation, and mutation of tyrosinase as the key enzyme of melanogenesis. In the present study, the activity, structure, reduction, and stability of native and modified enzymes were investigated after the modification of MT carboxylic residues by the Woodward reagent K (WRK). The relative activity of the sole enzyme was reduced from 100 to 77.9, 53.8, 39.4, and 26.4% after its modification by 2.5, 5, 25, and 50 ratios of [WRK]/[MT], respectively. The T_m values were calculated from thermal denaturation curves at 61.2, 60.1, 58.3, 53.9, and 45.5^{o}C for the sole and modified enzymes. The reduction of the ΔG_{H_2O} values for the modified enzyme in chemical denaturation indicated instability. A structural study by CD and intrinsic fluorescence technique revealed the fluctuation of the secondary and tertiary structures of MT.

Keywords: *modification, mushroom tyrosinase, Woodward reagent K, kinetics, structure.*

Introduction. Mushroom tyrosinase (E.C. 1.14.18.1), as a polyphenol oxidase, is a multifunctional copper-containing enzyme from the oxidase superfamily. It is widely distributed in microorganisms, plants, and animals [1]. It plays a key role in melanin biosynthesis through the catalysis of two disparate reactions: the hydroxylation of monophenols (cresolase or monophenolase activity) and the oxidation of *o*-diphenols (catecholase or diphenolase activity) into reactive *o*-quinones [2–4]. Modification is a good method to recognize the role of residues in the structure and function of proteins. The polar amino acids, such as glutamate, aspartate, lysine, arginine, histidine, serine, tyrosine, methionine, and tryptophan, can be modified by chemical reagents. The affinity of amino acids for participating in the reactions depends on environmental conditions like pH, the ionic power, the buffer type, and the nucleophilicity features [5]. The amino acid side-chains that participate in the enzymatic activity are usually accessible to the solvent and can be modified by the reagents that are especially accessible to proteins. Sometimes, according to the specific environment of the active site, we can design specific reagents. Chemical modification in the absence and presence of a ligand is a suitable method to recognize the side-chains of the amino acids′ active sites [6]. In enzymes, the catalytic amino acid side-chains can be selectively modified by using the suicide substrates, and these can result in enzyme inactivity. The modification of amino acid side-chains plays an important role in an enzyme′s catalytic activity [7]. MT has 576 residues, which can be divided into two parts. The residues numbering 1–392 form the chain part, and those numbering 393–576 form the propeptide part, which disappears in the mature form of MT. In the sequence of MT, the residues numbering 61, 85, and 94 are the binding sites of copper I (Cu^{1+}), and those numbering 259, 263, and 296 are the binding sites of copper II (Cu^{2+}). The mature MT includes 52 aspartic acid and glutamic acid residues in its sequence. The residues numbering 47, 50, 269, 273, 289, and 300, which are aspartic acid, and the residues numbering 67, 98, 102, and 256, which are glutamic acid, are located near the histidine residues of the MT active sites [8, 9]. The modification of these carboxyl groups by WRK causes enzymatic inactivation and the partial unfolding of the MT structure, leading to its instability.

Several studies have been done on the amino acid residues to reveal their respective roles in the function of enzymes. The modification of Tyr62 in lysozyme with N-bromosuccinimide caused a decrease in the catalytic velocity (K_{cat}) of the enzyme [10]. In the other investigations, the role of different catalytic groups was considered by the modification of residues e.g., the conversion of –SH to –OH in cysteine residues in the active site of papain [11], the conversion of –OH to –SH

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