

**НАУЧНОМ ВЕЋУ
ИНСТИТУТА ЗА МУЛТИДИСЦИПЛИНАРНА ИСТРАЖИВАЊА
УНИВЕРЗИТЕТА У БЕОГРАДУ**

Одлуком Научног већа Института за мултидисциплинарна истраживања Универзитета у Београду, донетој на седници одржаној 4.10.2016. године, изабрани смо у Комисију за оцену научно-истраживачког рада и испуњености услова др Драгосава Мутавцића, истраживача сарадника Института за мултидисциплинарна истраживања Универзитета у Београду, за избор у научно звање Научни сарадник.

На основу анализе научноистраживачког рада кандидата и увида у приложену документацију др Драгосава Мутавцића, подносимо Научном већу следећи

ИЗВЕШТАЈ

1. БИОГРАФСКИ ПОДАЦИ

Драгосав Р. Мутавцић магистар статистичких наука, је рођен 15. септембра 1970. године у Новој Вароши. Средњу школу је завршио у Новој Вароши 1989. године. Студије на Хемијском факултету у Београду (смер Хемија за истраживање и развој) уписао је 1990. године и дипломирао 04.07.2003. са оценом на дипломском раду 9 (девет) и просечном оценом у току студија 8,13. Магистарске студије на Економском факултету, Универзитета у Београду, одсек Статистичка анализа, уписао је школске 2003/04. године. Положио је све испите предвиђене планом и програмом магистарских студија са просечном оценом 9,28 и одбранио магистарску тезу 08.12.2010. године под називом „Примена мултиваријационе факторске анализе у флуоресцентној спектроскопији“. Докторску дисертацију под насловом "Примена мултиваријационе анализе на спектроскопским подацима" је пријавио 15.04.2013. и одбранио 28.09.2016. при Већу за мултидисциплинарне студије Универзитета у Београду.

Од 01.04.2005. године запослен је као истраживач приправник на Институту за мултидисциплинарна истраживања, Универзитета у Београду. У звање истраживач-сарадник изабран је 19. 03. 2014. године. Током досадашњег истраживачког рада на Институту за мултидисциплинарна истраживања, учествовао је на пројектима Министарства за науку и технолошки развој Републике Србије, број 1911 - „Ћелијски одговор на стрес код дрвећа изазван загађењем: Могућност примене у биомониторингу животне средине“ (2005), и на пројекту број 143043 - „Испитивања нових биосензора за мониторинг и дијагностику биљака“ (2006-2010), а у новом пројектном циклусу Министарства просвете и науке Републике Србије ангажована је на пројекту 173017 – „Испитивање односа структура-функција у ћелијском зиду биљака и измене структуре зида ензимским инжењерингом“ (2011-2016).

Актуелне области истраживања Драгосава Мутавџића су статистичка анализа и спектроскопија, у циљу добијања релевантних информација о анималним и биљним системима различите сложености, као и о наночестицама које имају различите примене.

2. БИБЛИОГРАФИЈА

M21a Радови у врхунским међународним часописима (2 x 10 = 20 укупно)

1. **Mutavdžić, D.**; Xu, J.; Thakur, G.; Triulzi, R.; Kasas, S.; Jeremić, M.; Leblanc, R.; Radotić, K. Determination of the Size of Quantum Dots by Fluorescence Spectroscopy. *Analyst* **2011**, *136*, 2391–6. (IF₂₀₁₀=3.843)
2. Algarra, M.; Campos, B.; Radotić, K.; **D. Mutavdžić**; Bandosz, T.; Jiménez-Jiménez, J.; Rodríguez-Castellón, E.; Da Silva, J.; Luminescent carbon nanoparticles: effects of chemical functionalization, and evaluation of Ag⁺ sensing propertie, *Journal of Materials Chemistry A* **2014**, *2*, 8342-8351. (IF₂₀₁₄=7.443)

M21 Радови у врхунским међународним часописима (11 x 8 = 88 укупно)

3. Milić, S.; Bogdanović Pristov, J.; **Mutavdžić, D.**; Savić, A.; Spasić, M.; Spasojević, I. The Relationship of Physicochemical Properties to the Antioxidative Activity of Free Amino Acids in Fenton System. *Environ. Sci. Technol.* **2015**, *49*, 4245–54. (IF₂₀₁₅=6.396)
4. Campos, B. B.; Algarra, M.; Radotić, K.; **Mutavdžić, D.**; Rodríguez-Castellón, E.; Jiménez-Jiménez, J.; Alonso, B.; Casado, C. M.; Esteves da Silva, J. C. ZnS:Mn Nanoparticles Functionalized by PAMAM-OH Dendrimer Based Fluorescence Ratiometric Probe for Cadmium. *Talanta* **2015**, *134*, 317–24. (IF₂₀₁₅=4.035)
5. Dragišić Maksimović, J.; Poledica, M.; **Mutavdžić, D.**; Mojović, M.; Radivojević, D.; Milivojević, J. Variation in Nutritional Quality and Chemical Composition of Fresh Strawberry Fruit: Combined Effect of Cultivar and Storage. *Plant Foods Hum Nutr* **2015**, *70*, 77–84. (IF₂₀₁₅=2.733)
6. Algarra, M.; Radotić, K.; Kalauzi, A.; **Mutavdžić, D.**; Savić, A.; Jiménez-Jiménez, J.; Rodríguez-Castellón, E.; Silva, J. C. da; Guerrero-González, J. J. Fingerprint Detection and Using Intercalated CdSe Nanoparticles on Non-Porous Surfaces. *Anal. Chim. Acta* **2014**, *812*, 228–35. (IF₂₀₁₄=4.841)
7. Radotić, K.; Roduit, C.; Simonović, J.; Hornitschek, P.; Fankhauser, C.; **Mutavdžić, D.**; Steinbach, G.; Dietler, G.; Kasas, S. Atomic Force Microscopy Stiffness Tomography on Living Arabidopsis Thaliana Cells Reveals the Mechanical Properties of Surface and Deep Cell-Wall Layers during Growth. *Biophys. J.* **2012**, *103*, 386–94. (IF₂₀₁₀=4.692)
8. Spasić, S.; Nikolić, L. j; **Mutavdžić, D.**; Saponjić, J. Independent Complexity Patterns in Single Neuron Activity Induced by Static Magnetic Field. *Comput Methods Programs Biomed* **2011**, *104*, 212–8. (IF₂₀₁₀=1.531)

9. Spasic, S.; Culic, M.; Grbic, G.; Martac, L.; Sekulic, S.; **Mutavdzic, D.** Spectral and Fractal Analysis of Cerebellar Activity after Single and Repeated Brain Injury. *Bull. Math. Biol.* **2008**, *70*, 1235–49. (IF₂₀₀₆=1.620)
10. Kalauzi, A.; **Mutavdžić, D.**; Djikanović, D.; Radotić, K.; Jeremić, M. Application of Asymmetric Model in Analysis of Fluorescence Spectra of Biologically Important Molecules. *Journal of Fluorescence* **2007**, *17*, 319–29. (IF₂₀₀₆=2.610)
11. Marjanović, Ž.; Glišić, A.; **Mutavdžić, D.**; Saljnikov, E.; Ecosystems supporting *Tuber magnatum* Pico production in Serbia experience specific soil environment seasonality that may facilitate truffle lifecycle completion. *Applied Soil Ecology* **2015**. at (IF₂₀₁₄=3.105)
12. Mitrovic, A.; Donaldson L.; Djikanovic, D.; Bogdanovic-Pristov, J.; Simonovic, J.; **Mutavdzic, D.**; Kalauzi, A.; Maksimovic, V.; Nanayakkara, B.; Radotic, K.; Analysis of static bending-induced compression wood formation in juvenile *Picea omorika* (Pančić) Purkyně. *Trees-Structure and function* **2015**. (IF₂₀₁₄=1.928)
13. Spasic, S.; Culic, M.; Grbic, G.; Martac, Lj.; Sekulic, S.; **Mutavdzic, D.**; Spectral and Fractal Analysis of Cerebellar Activity After Single and Repeated Brain Injury, *Bulletin of Mathematical Biology* 2008, *70*, 1235-1249 (IF₂₀₀₆=1.720)

M22 Радови у водећим међународним часописима (5 x 5 = 25 укупно)

14. Marković, J. M.; Trišović, N. P.; **Mutavdžić, D.**; Radotić, K.; Juranić, I. O.; Drakulić, B. J.; Marinković, A. D. Solvatochromism of Symmetrical 2,6-Distyrylpyridines. An Experimental and Theoretical Study. *Spectrochim Acta A Mol Biomol Spectrosc* **2015**, *135*, 435–46. (IF₂₀₁₅=2.653)
15. Cukic, M.; Oommen, J.; **Mutavdzic, D.**; Jorgovanovic, N.; Ljubisavljevic, M. The Effect of Single-Pulse Transcranial Magnetic Stimulation and Peripheral Nerve Stimulation on Complexity of EMG Signal: Fractal Analysis. *Exp Brain Res* **2013**, *228*, 97–104. (IF₂₀₁₁=2.533)
16. Todorović, D.; Kalauzi, A.; Prolić, Z.; Jović, M.; **Mutavdžić, D.** A Method for Detecting the Effect of Magnetic Field on Activity Changes of Neuronal Populations of *Morimus Funereus* (Coleoptera, Cerambycidae). *Bioelectromagnetics* **2007**, *28*, 238–41. (IF₂₀₀₇=1.799)
17. Radotic, K.; Ducic, T.; **Mutavdzic, D.** Changes in Peroxidase Activity and Isoenzymes in Spruce Needles after Exposure to Different Concentrations of Cadmium. *Environ. Exp. Bot.* **2000**, *44*, 105–113. (IF₂₀₀₀=0.873)

18. Mirković, J.; Božić, B.; **Mutavdžić, D.**; Ušćumlić, G.; Mijin, D.; Solvent and structural effects on the spectral shifts of 5-(substituted phenylazo)-3-cyano-6-hydroxy-1-(2-hydroxyethyl)-4-methyl-2-pyridones *Chemical Physics Letters* **2014**, *615*, 62-68 (IF₂₀₁₂=2.150)

M23 Радови у водећим међународним часописима (3 x 3 = 9 укупно)

19. Andrijevic, Lj.; Radotic, K.; Bogdanovic, J.; **Mutavdzic, D.**; Bogdanovic, G.; Antiproliferative Effect of Synthetic Lignin against Human Breast Cancer and Normal Fetal Lung Cell Lines. Potency of Low Molecular Weight Fractions. *JBUON* **2008**, *13*, 241–4. (IF₂₀₀₈=0.64)
20. Mitrović, A.; Maksimović, V.; **Mutavdžić, D.**; Bogdanovic Pristov, J.; Total phenol content and total antioxidant activity drop during *Tacitus bellus* direct shoot organogenesis. *Russian Journal of Plant Physiology* **2015**, *62*, 700-705 (IF₂₀₁₄=0.963)
21. Spasic, S.; Nikolic, Lj.; **Mutavdzic, D.**; Effect of a static magnetic field on the fractal complexity of bursting activity of the BR neuron in the snail detected by factor analysis, *Archives of Biological Sciences* **2011**, *63*, 177-183 (IF₂₀₁₄=0.360)

M34 Саопштења на скуповима међународног значаја штампана као изводи (5 x 0,5 = 2,5 укупно)

22. Radotic K., Mouille G., Djikanovic D., **Mutavdzic D.**, Thevenin J., Jouanin L. , Combination of FTIR Microscopy and Exitation of Arabidopsis Thaliana Stem Cell Wall by Specific Solvents. Differences in Cell Wall Nanoarchitecture Between Wild Type and Cad C, Cad D and Double mutant, 12th European Conference on the Spectroscopy of Biological Molecules , 1-6 september 2007, Bobigny, France, 277
23. Radotić K., Kalauzi A., **Mutavdžić D.**, Djikanović D., Donaldson L., Jeremić M. (2008). Application of mathematical models in analysis of fluorescence spectra of biological molecules in solution and in microscopic imaging. *International Conference "From Solid State To BioPhysics IV"*, June 6 - 13, 2008, Cavtat, Dubrovnik, Croatia. *Book of abstracts*.
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25. Bogdanović Pristov J., Mitrović A., Djikanović D., **Mutavdžić D.**, Simonović J., Radotić R. and Spasojević I. (2010) Hydroxyl radical-scavenging capacity of cell wall from

needles of serbian spruce (Picea omorika(Pančić) Purkyně) *Workshop on "wood structure/function relationships" October 5-8, 2010 Hamburg, Germany*

26. Pristov J., Mitrović A., Maksimović V, Djikanović D., **Mutavdžić D.**, Simonović J. and. Radotić K. (2009) Variability and relation of lignin, low molecular mass phenolics and cell wall bound peroxidases in the needels of Serbian spruce (Picea omorika (Pančić) Purkyně) during four seasons *Workshop on single fiber testing and modeling November 4-5, 2009 | Stockholm, Sweden*

M52 Радови у часописима националног значаја (1 x 1,5 = 1,5 укупно)

1. Mutavdžić, M.; Mutavdžić, D.; Radotić, K.; Milojković – Opsenica, D.; Differentiation of wine commercial samples by using fluorescence spectroscopy and Multivariate Analysis. *Acta Agriculturae Serbica*, **2013**, 13, 169-1771

M71 Одбрањена докторска дисертација (1 x 6 = 6 укупно)

Мутавцић Д. (2016) "Примена мултиваријационе анализе на спектроскопским подацима", Веће за мултидисциплинарне студије, Универзитет у Београду.

M72 Одбрањен магистарски рад (1 x 3 = 3 укупно)

Мутавцић Д. (2010) "Примена мултиваријационе факторске анализе у флуоресцентној спектроскопији", Економски факултет Универзитета у Београду.

3. АНАЛИЗА НАУЧНОГ РАДА

Научни рад др Драгосава Мутавцића припада Хеометрији. Кандидат је резултате истраживања објавио у 21 раду у међународним часописима (2 рада у M21a, 11 у M21, 5 у M22 и 3 у M23), једном раду у часопису националног значаја као и 5 саопштења на међународним конференцијама.

Кандидат се у свом научном раду бавио математичко-статистичком обрадом спектроскопских сигнала (углавном флуоресцентних и инфра-црвених), применом мултиваријационе анализе и алата класичне статистике у обради података регистрованих у разним биолошким и биохемијским експериментима.

У раду 1 кандидат се бавио проучавањем корелисаности позиције флуоресцентних максимума са дијаметрима два типа квантних тачака: CdSe- као примера хидрофобних и CdSe/ZnS као примера хидрофилних квантних тачака. У оквиру овог испитивања предложен је метод за одређивање дијаметра фракција наночестица различитих димензија присутних у узорцима, применом развијене факторске анализе и мултиваријационе резолуције кривих на њихове ексцитационо-емисионе матрице.

У раду 2 су проучаване наночестице на бази угљеника (карбонске тачке), које су се појавиле недавно као резултат потраге за новим наноматеријалима. Испитивана је могућност примене ових наночестица као сензора за одређивање концентрације Ag^+ јона. У оквиру карактерисања ових наночестица анализирани су флуоресцентни спектри

карбонских тачака функционализованих са MSA и MSA@Ag⁺, како би се окарактерисале ове наночестице и утврдили параметри за њихову оптималну примену. Коришћена је мултиваријациона резолуција кривих. Анализа је указала на стабилност овог материјала и његову могућу примену у детекцији јона метала.

Компонентна анализа флуоресцентних спектра нових хемијских наносензора за Cd²⁺ јоне, који су базирани на PAMAM-OH дендримерима треће генерације, је примењена у раду 4. Мултиваријациона резолуција кривих је примењена на ексцитационо-емисионе матрице узорака чистог ZnS, чистог PAMAM-OH_{G=3} дендримера, ZnS:Mn и ZnS:Mn@PAMAM-OH_{G=3}. Резултати одређивања концентрације Cd²⁺ јона новопредложеним наносензором показали су незнатно одступање у односу на резултате добијене помоћу атомске апсорпционе спектроскопије. Упоредивање прецизности ове две методе дало је следеће резултате: ZnS:Mn@PAMAM-OH_{G=3} сензор је показао просечну прецизност од 5,88% ± 2,45%, док је атомска апсорпциона спектроскопија имала прецизност од 1,41%±0,76%.

Анализе емисионих флуоресцентних спектра помоћу мултиваријационе резолуције кривих, у оквиру рада 6, су допринеле карактерисању и показивању могућности примене CdSe квантних тачака, уграђених у функционализоване порозне фосфатне наноструктуре са аминокиселином (PPH-NH₂@CdSe), у детекцији латентних отисака прстију на различитим непорозним површинама. Резултат целокупног рада, је нови метод за побољшање квалитета слике отисака прстију, применом новог праха.

У делу радова, кандидат је користио одговарајуће напредне математичко-статистичке технике (анализа независних компоненти, факторска анализа и др.) за анализирање ефеката магнетног поља на промене неуронских популација (16), на изворе сложене неуронске активности код пужева (8 и 21), као и за анализу церебралне активности после једне и више повреда мозга (13). У раду 14 кандидат је користио флуоресцентну спектроскопију и мултиваријациону резолуцију кривих у циљу спектроскопске карактеризације симетричних 2,6-дистирилпиридена.

У докторској дисертацији, Драгосав Мутавцић се бавио проучавањем интеракције говеђег серум албумина (БСА), као најзаступљенијег протеина крвне плазме, са аденозин трифосфатом (АТФ). Интеракција је проучавана Паралелном факторском анализом која је била примењена на тензорима регистрованим у узорцима БСА и АТФ-а у различитим односима и у два времена: одмах након мешања БСА и АТФ и два сата након мешања.

Кандидат се у дисертацији бавио и проучавањем наноструктурних карактеристика ћелијског зида дивљег типа и мутаната *Arabidopsis thaliana*, која се користи као погодан експериментални модел за проучавање структуре и архитектуре ћелијског зида. Анализом разлике спектра дивљег типа и мутанта уочено је да се дивљи тип и мутант разликују у количини лигнина, хемицелулоза и целулозе, као и алдехида и коњугованих алдехида.

4. КВАНТИТАТИВНА ОЦЕНА РЕЗУЛТАТА НАУЧНОИСТРАЖИВАЧКОГ РАДА

Испуњеност квантитативних захтева за избор у звање научни сарадник др Драгосава Мутавцића за област природно-математичких и медицинских наука, према Правилнику о

поступку и начину вредновања, и квантитативном исказивању научноистраживачких резултата истраживача (Сл. Гласник, бр 38, 14.04.2008) приказана је у Табели:

За природно-математичке науке

Диференцијални услов – од првог избора у претходно звање до избора у звање:		Неопходно	Остварено
Научни сарадник	Укупно	16	153,5
	$M10+M20+M31+M32+M33+M41+M42 \geq$	10	153,5
	$M11+M12+M21+M22+M23+M24 >$	5	153,5

5. КВАЛИТАТИВНИ ПОКАЗАТЕЉИ НАУЧНОИСТРАЖИВАЧКОГ РАДА

5.1. Показатељи успеха у научном раду

Током свог досадашњег рада др Драгосав Мутавцић имао је сарадњу са др Мануелом Алгаром са Универзитета у Малаги, Шпанија, која је резултовала са три научна рада категорије M21a и M21, са проф. Роцером Лебланом са Универзитета у Мајамију, која је резултовала са једним научним радом M21a, као и са др Лојдом Доналдсоном са Института Сцион у Роторуи, Нови Зеланд, која је резултовала једним научним радом M21.

Учествовао је у раду на следећим домаћим научним пројектима:

Пројекат број 1911 - „Ћелијски одговор на стрес код дрвећа изазван загађењем: Могућност примене у биомониторингу животне средине“ (2005),

Пројекат број 143043 - „Испитивања нових биосензора за мониторинг и дијагностику биљака“ (2006-2010)

Пројекат број 173017 – „Испитивање односа структура-функција у ћелијском зиду биљака и измене структуре зида ензимским инжењерингом“ (2011-2016).

5.2. Квалитет научних радова-цитираност

Цитираност радова дата је у Прилогу.

6. ЗАКЉУЧАК И ПРЕДЛОГ

У свом научноистраживачком раду др Драгосав Мутавцић се бавио применом хеометријских метода у конкретним истраживачким задацима, претежно у анализи флуоресцентних емисионих спектра и инфрацрвених спектра у системима различите сложености, односно узорака наночестица, протеина и биолошких узорака. Његов рад је

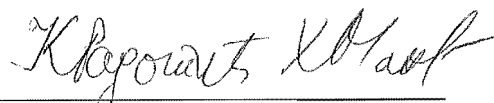
дао допринос у карактерисању наночестица (квантних и карбонских тачака) у контексту различитих примена, као и праћењу структурних прелаза код протеина изазваних одређеним поремећајем. У биолошким системима, применом напредних и класичних статистичких метода допринео је разумевању структурних промена ћелијског зида, које настају услед мутација у биосинтези његових конститутивних полимера, као и структурних и физиолошких промена биљке изазваних одређеним стресорима, на различитим нивоима сложености. Сем поменутих метода, кандидат је коришћењем напредних математичко-статистичких техника дао допринос у проучавању ефеката магнетног поља на неуронску активност код пужева.

Резултати рада др Драгосава Мутавцића објављени су у 21 међународном часопису (од којих 2 у међународним часописима изузетних вредности – M21a, 11 у врхунским међународним часописима – M21, 5 у истакнутим међународним часописима – M22 и 3 у међународним часописима – M23). Укупна остварена вредност коефицијента M је 63.5, укупан ИФ је 58.468 и број цитата (без аутоцитата) је 258.


На основу свих наведених података, анализе и оцене научноистраживачке делатности др Драгосава Мутавцића, чланови комисије сматрају да је кандидат својим досадашњим радом, који се огледа у објављеним радовима у иностраним и домаћим часописима и научним скуповима, као и значајном ангажовању на научним пројектима, **испунио све услове за избор у звање Научни сарадник и предлагемо Научном већу Института за мултидисциплинарна истраживања да прихвати овај извештај и донесе одлуку о предлогу за избор кандидата у звање Научни сарадник.**

У Београду, 01.11.2016.

Чланови комисије:



Др Ксенија Радотић Хаци-Манић
Научни саветник Института за мултидисциплинарна истраживања
Универзитета у Београду



Др Душанка Милојковић Опсеница
Редовни професор Хемијског факултета
Универзитета у Београду



Др Александра Митровић
Виши научни сарадник Института за мултидисциплинарна истраживања
Универзитета у Београду

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**V Испуњеност услова за стицање предложеног научног звања на основу
коэффицијената М**

**МИНИМАЛНИ КВАНТИТАТИВНИ ЗАХТЕВИ ЗА СТИЦАЊЕ
ПОЈЕДИНАЧНИХ НАУЧНИХ ЗВАЊА**

За природно-математичке и медицинске науке

Диференцијални услов: од првог избора у пертходно звање до избора у звање Потребно је да кандидат има најмање XX поена, који треба да припадају следећим категоријама:		
		Неопходно XX=	Остварено
Нучни сарадник	Укупно	16	153,5
	$M10+M20+M31+M32+M33$ $M41+M42 \geq$	10	153,5
	$M11+M12+M21+M22$ $M23+M24 \geq$	5	153,5
Виши научни сарадник	Ukupno	48	
	$M10+M20+M31+M32+M33$ $M41+M42+M51 \geq$	40	
	$M11+M12+M21+M22$ $M23+M24+M31+M32+M41+M42 \geq$	28	
Научни саветник	Ukupno	65	
	$M10+M20+M31+M32+M33$ $M41+M42+M51 \geq$	50	
	$M11+M12+M21+M22$ $M23+M24+M31+M32 \geq$	35	