

# IEEE TRANSACTIONS ON NANOBIOSCIENCE

A PUBLICATION OF  
THE IEEE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY  
THE IEEE COMPUTER SOCIETY  
THE IEEE ROBOTICS AND AUTOMATION SOCIETY  
THE IEEE COMPUTATIONAL INTELLIGENCE SOCIETY  
THE IEEE NANOTECHNOLOGY COUNCIL

TECHNICALLY COSPONSORED BY  
THE IEEE SYSTEMS, MAN AND CYBERNETICS SOCIETY

Indexed in the National Library of Medicine, PubMed®, and MEDLINE®



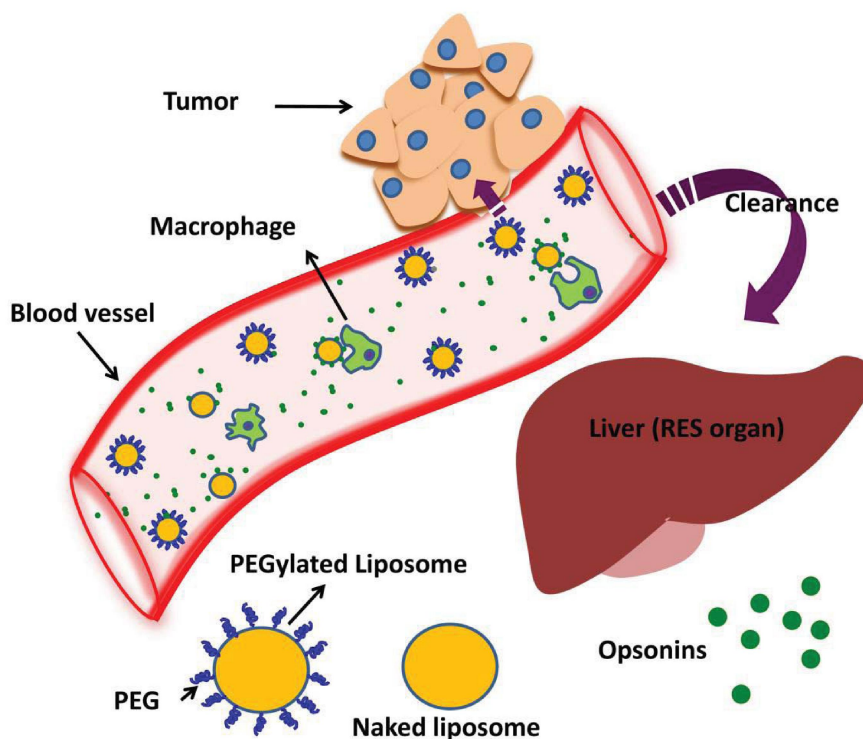
OCTOBER 2016  
DECEMBER 2016

VOLUME 15  
VOLUME 15

NUMBER 7  
NUMBER 8

ITMCEL

(ISSN 1536-1241)



For the October 2016 issue, see pp. 597–598 for Table of Contents.

For the December 2016 issue, see p. 793–794 for Table of Contents.

Fig. 3 from “Nanoparticles for siRNA-Based Gene Silencing in Tumor Therapy,”

by Anish Babu, Ranganayaki Muralidharan, Narsireddy Amreddy, Meghna Mehta, Anupama Munshi, and Rajagopal Ramesh (pp. 849–863).

# IEEE TRANSACTIONS ON NANOBIOSCIENCE

A PUBLICATION OF  
THE IEEE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY  
THE IEEE COMPUTER SOCIETY  
THE IEEE ROBOTICS AND AUTOMATION SOCIETY  
THE IEEE COMPUTATIONAL INTELLIGENCE SOCIETY  
THE IEEE NANOTECHNOLOGY COUNCIL

TECHNICALLY COSPONSORED BY  
THE IEEE SYSTEMS, MAN AND CYBERNETICS SOCIETY

Indexed in the National Library of Medicine, PubMed®, and MEDLINE®



OCTOBER 2016

VOLUME 15

NUMBER 7

ITMCEL

(ISSN 1536-1241)

## SPECIAL SECTION ON 9th EAI INTERNATIONAL CONFERENCE ON BIO-INSPIRED INFORMATION AND COMMUNICATIONS TECHNOLOGIES 2015 (BICT 2015)

### SPECIAL SECTION PAPERS

Capacity and Delay Spread in Multilayer Diffusion-Based Molecular Communication (DBMC) Channel .....	599
..... S. Md Mustam, S. K. Syed-Yusof, and S. Zubair	
Optimal Fungal Space Searching Algorithms .... E. Asenova, H.-Y. Lin, E. Fu, D. V. Nicolau, Jr., and D. V. Nicolau	613
Achievable Strength-Based Signal Detection in Quantity-Constrained PAM OOK Concentration-Encoded Molecular Communication ..... M. U. Mahfuz	619
Propagation Delay and Loss Analysis for Bacteria-Based Nanocommunications .....	627
..... V. Petrov, D. Moltchanov, I. F. Akyildiz, and Y. Koucheryavy	

### REGULAR PAPERS

Decoder Design Based on Spiking Neural P Systems .....	639
..... J. Li, Y. Huang, and J. Xu	
Tissue P Systems With Channel States Working in the Flat Maximally Parallel Way .....	645
..... B. Song, M. J. Pérez-Jiménez, G. Păun, and L. Pan	
Effective Natural PCR-RFLP Primer Design for SNP Genotyping Using Teaching-Learning-Based Optimization With Elite Strategy .....	657
..... Y.-H. Cheng, C.-N. Kuo, and C.-M. Lai	
Spiking Neural P Systems With White Hole Neurons .....	666
..... T. Song, F. Gong, X. Liu, Y. Zhao, and X. Zhang	
TargetM6A: Identifying N <sup>6</sup> -Methyladenosine Sites From RNA Sequences via Position-Specific Nucleotide Propensities and a Support Vector Machine .....	674
..... G.-Q. Li, Z. Liu, H.-B. Shen, and D.-J. Yu	
TNP-470 Reduces Glioblastoma Angiogenesis in Three Dimensional GelMA Microwell Platform .....	683
..... D. T. Nguyen, Y. Fan, Y. M. Akay, and M. Akay	

(Contents Continued on Page 598)

IEEE TRANSACTIONS ON NANOBIOSCIENCE (ISSN 1536-1241) is published quarterly in print and bimonthly online by the Institute of Electrical and Electronics Engineers, Inc. Responsibility for the contents rests upon the authors and not upon the IEEE, the Society/Council, or its members. **IEEE Corporate Office:** 3 Park Avenue, 17th Floor, New York, NY 10016-5997. **IEEE Operations Center:** 445 Hoes Lane, Piscataway, NJ 08854-4141. **NJ Telephone:** +1 732 981 0060. **Price/Publication Information:** Individual copies: IEEE Members \$20.00 (first copy only), nonmembers \$339.00 per copy. (Note: Postage and handling charge not included.) Member and nonmember subscription prices available upon request. **Copyright and Reprint Permissions:** Abstracting is permitted with credit to the source. Libraries are permitted to photocopy for private use of patrons, provided the per-copy fee of \$31.00 is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For all other copying, reprint, or republication permission, write to Copyrights and Permissions Department, IEEE Publications Administration, 445 Hoes Lane, Piscataway, NJ 08854-4141. Copyright © 2016 by the Institute of Electrical and Electronics Engineers, Inc. All rights reserved. **Postmaster:** Send address changes to IEEE TRANSACTIONS ON NANOBIOSCIENCE, IEEE, 445 Hoes Lane, Piscataway, NJ 08854-4141. GST Registration No. 125634188. CPC Sales Agreement #40013087. Return undeliverable Canada addresses to: Pitney Bowes IMEX, P.O. Box 4332, Stanton Rd., Toronto, ON M5W 3J4, Canada. IEEE prohibits discrimination, harassment and bullying. For more information visit <http://www.ieee.org/nondiscrimination>. Printed in U.S.A.



---

Polymeric Microporous Nanofilms as Smart Platforms for <i>in Vitro</i> Assessment of Nanoparticle Translocation and Caco-2 Cell Culture .....	<i>L. Ricotti, G. Gori, D. Cei, J. Costa, G. Signore, and A. Ahluwalia</i>	689
On Chip Bioelectric Impedance Spectroscopy Reveals the Effect of P-Glycoprotein Efflux Pumps on the Paracellular Impedance of Tight Junctions at the Blood–Brain Barrier .....	<i>R. Kraya, A. Komin, and P. Searson</i>	697
Temporal Control of Osteoblast Cell Growth and Behavior Dictated by Nanotopography and Shear Stress .....	<i>U. Dhawan, H.-A. Pan, Y. H. Chu, G. S. Huang, P. C. Chen, and W.-L. Chen</i>	704
Comprehensive Reactive Receiver Modeling for Diffusive Molecular Communication Systems: Reversible Binding, Molecule Degradation, and Finite Number of Receptors .....	<i>A. Ahmadzadeh, H. Arjmandi, A. Burkovski, and R. Schober</i>	713
PCE-FR: A Novel Method for Identifying Overlapping Protein Complexes in Weighted Protein-Protein Interaction Networks Using Pseudo-Clique Extension Based on Fuzzy Relation .....	<i>B. Cao, J. Luo, C. Liang, S. Wang, and P. Ding</i>	728
Di-Block PLCL and Tri-Block PLCLG Matrix Polymeric Nanoparticles Enhanced the Anticancer Activity of Loaded 5-Fluorouracil .....	<i>A. E. Ashour, M. M. Badran, A. Kumar, A. K. Rishi, and A. E. Yassin</i>	739
Conjugation of Bovine Serum Albumin With ZnO Nanosphere-A Novel Approach for Ultra-Low Level Mercury Ion Detection .....	<i>M. Sasmal, T. K. Maiti, and T. K. Bhattacharyya</i>	748
Modeling of SAM Impedance Onto Gold and Silver Thin-Film Mass-Produced Electrodes and Their Use for Optimization of Lactic Acid Detection .....	<i>G. Rosati, M. Scaramuzza, E. Pasqualotto, A. De Toni, C. Reggiani, and A. Paccagnella</i>	756
A Biochemical Oscillator Using Excitatory Molecules for Nanonetworks .....	<i>E. Shitiri and H.-S. Cho</i>	765
Modeling Current-Voltage Characteristics of Proteorhodopsin and Bacteriorhodopsin: Towards an Optoelectronics Based on Proteins .....	<i>E. Alfinito and L. Reggiani</i>	775
Dielectrophoretic Relay Assisted Molecular Communication for In-Sequence Molecule Delivery .....	<i>P. Manocha, G. Chandwani, and S. Das</i>	781

---