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Contents

Editorial

The inaugural *Nano Research* Young Innovators (NR45) Award in nanobiotechnology

Zhen Gu[1,*] and Hongjie Dai[2,*]

[1] University of California, Los Angeles, USA
[2] Stanford University, USA

4931–4935

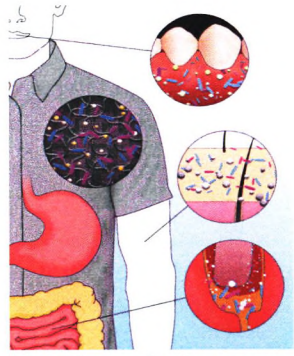
Review Articles

Inorganic nanoparticles and the microbiome

Kunyu Qiu, Phillip G. Durham, and Aaron C. Anselmo*

University of North Carolina at Chapel Hill, USA

4936–4954



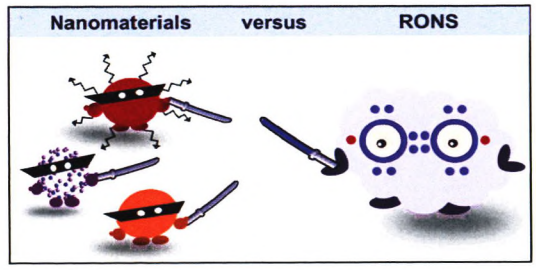
The human microbiota is routinely exposed to the inorganic nanoparticles present in consumer goods such as clothing, sunscreen, toothpaste, and foods. Here, we review current literature describing the effect of exposure to inorganic nanoparticles on the microbiome.

Scavenging of reactive oxygen and nitrogen species with nanomaterials

Carolina A. Ferreira, Dalong Ni*, Zachary T. Rosenkrans, and Weibo Cai*

University of Wisconsin-Madison, USA

4955–4984



Reactive oxygen and nitrogen species are implicated in various diseases. Herein, we review the intrinsic antioxidant properties, radical-scavenging mechanisms, and *in vivo* applications of several types of nanoparticles.

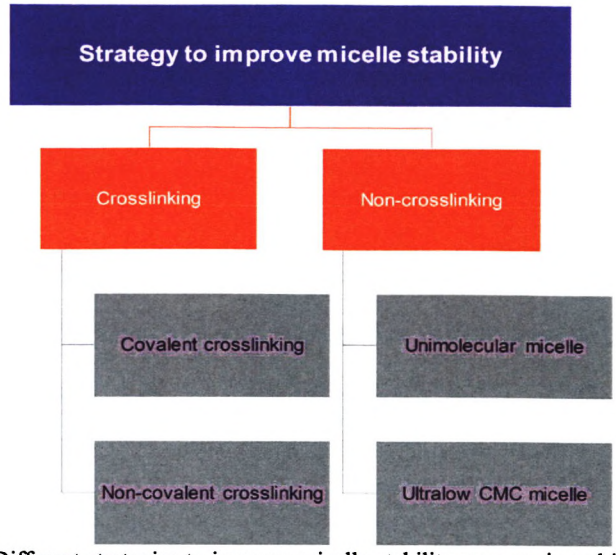
TSINGHUA UNIVERSITY PRESS Springer

Strategies to improve micelle stability for drug delivery

Yang Lu, Ershuai Zhang, Jianhai Yang, and Zhiqiang Cao*

Wayne State University, USA

4985–4998



Different strategies to improve micelle stability were reviewed in this work. Specific examples with improved drug delivery efficacy owing to enhanced micelle stability were illustrated.

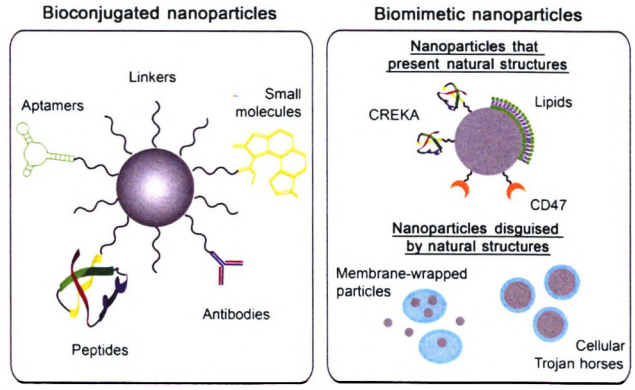
Advances in targeted nanotherapeutics: From bioconjugation to biomimicry

Danielle M. Valcourt[1], Jenna Harris[1], Rachel S. Riley[1], Megan Dang[1], Jianxin Wang[1], and Emily S. Day[1,2,*]

[1] University of Delaware, USA

[2] Helen F. Graham Cancer Center & Research Institute, USA

4999–5016



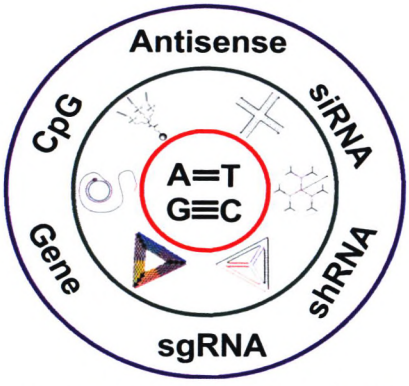
This review provides insight into the benefits and limitations of two types of targeted nanoparticle systems under investigation for cancer therapy: bioconjugated nanoparticles and biomimetic nanoparticles.

Multifunctional nucleic acid nanostructures for gene therapies

Jianbing Liu[1], Zhengang Wang[1], Shuai Zhao[1,2], and Baoquan Ding[1,2,*]

[1] National Center for Nanoscience and Technology, China
[2] University of Chinese Academy of Sciences, China

5017–5027



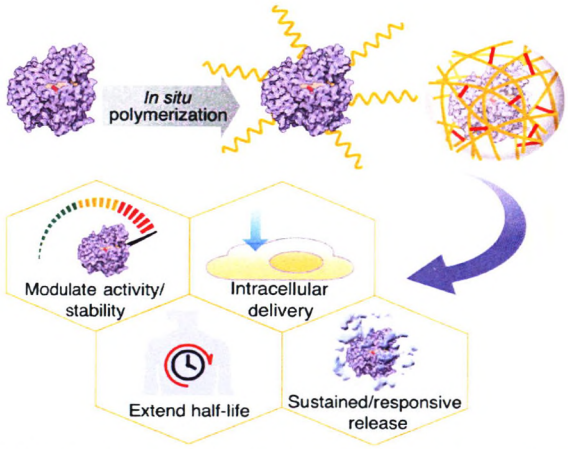
Nucleic acid nanostructures have been rationally designed as delivery vehicles for gene therapies based on RNA interference, CRISPR-Cas9 genome editing, gene expression, or CpG-based immunostimulation.

***In situ* polymerization on biomacromolecules for nanomedicines**

Xiangqian Jia, Luyao Wang, and Juanjuan Du*

Tsinghua University, China

5028–5048



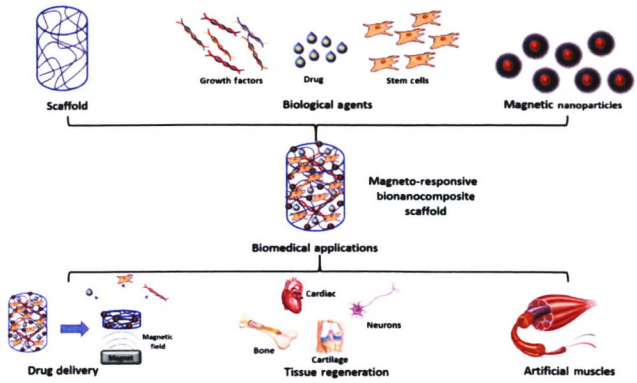
While holding vast promise for the treatment of many disorders, biopharmaceuticals still face critical challenges. *In situ* polymerization provides an appealing and promising platform to improve the pharmacological characteristics of biopharmaceuticals.

Biomedical applications of magneto-responsive scaffolds

Adedokun A. Adedoyin and Adam K. Ekenseair*

Northeastern University, USA

5049–5064



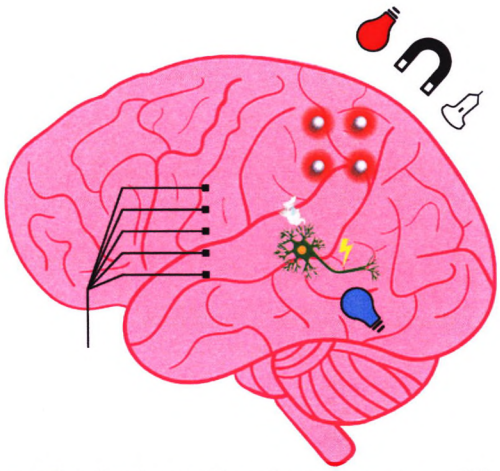
This review paper highlights the theory, fabrication and increasing use of magnetic nanoparticles to create biomaterials that are responsive to external magnetic fields for applications in drug delivery, tissue regeneration and artificial muscles.

Nano functional neural interfaces

Yongchen Wang[1], Hanlin Zhu[2], Huiran Yang[1,3], Aaron D. Argall[1], Lan Luan[2], Chong Xie[2,*], and Liang Guo[1,*]

[1] The Ohio State University, USA
[2] The University of Texas at Austin, USA
[3] Nanjing Tech University, China

5065–5106



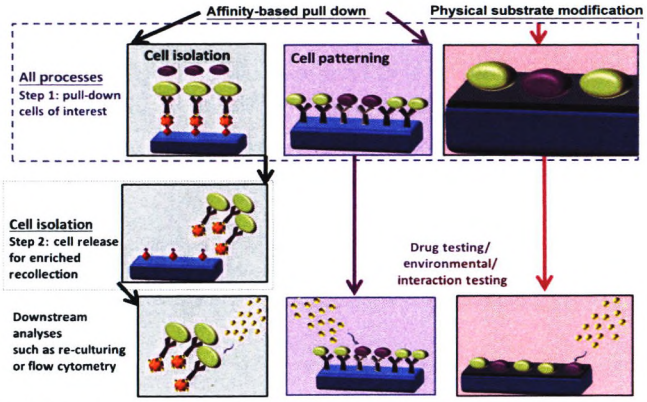
Engineered functional neural interfaces serve as essential abiotic–biotic transducers between an engineered system and the nervous system. This review covers the exciting developments and applications of functional neural interfaces that rely on nano-electrodes, nanotransducers, or bionanotransducers to establish an interface with the nervous system.

Plenty more room on the glass bottom: Surface functionalization and nanobiotechnology for cell isolation

Ali Ansari[1,*] and P. I. Imoukhuede[2,*]

[1] University of Illinois at Urbana-Champaign, USA
[2] Washington University in St. Louis, USA

5107–5129



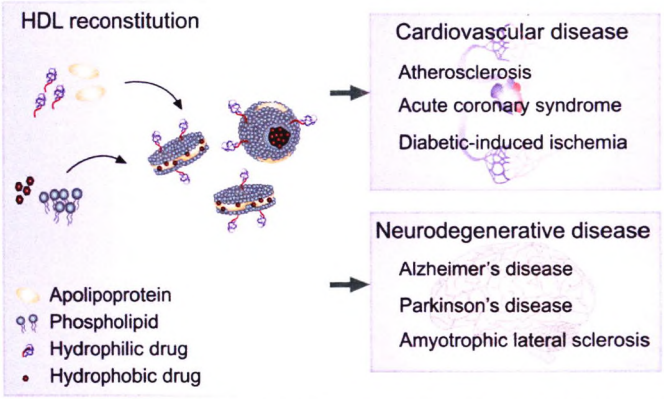
Modifying surfaces using surface functionalization has recently become much more commonplace, as it enables adaptive or responsive surfaces to be created for more complex testing modalities and biological applications. In this review, we discuss the many applications of surface functionalization techniques to both cell capture and cell isolation modalities, to provide expand the toolset for researchers who would like to adopt them.

High-density lipoprotein mimetic nanotherapeutics for cardiovascular and neurodegenerative diseases

Song Ih Ahn, Hyun-Ji Park, Jiwon Yom, Taeyoung Kim, and Yong Tae Kim*

Georgia Institute of Technology, USA

5130–5143



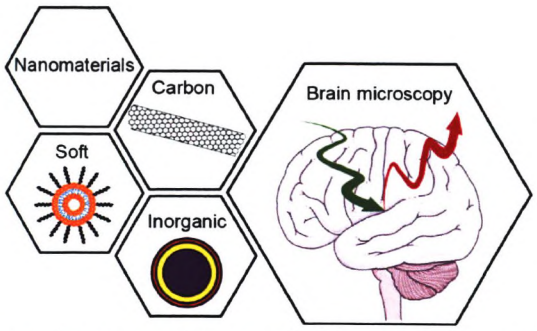
This review introduces the heterogeneous characteristics and biological functions of high-density lipoproteins (HDLs), highlights the current representative applications of HDL mimetic nanotherapeutics for cardiovascular and neurodegenerative diseases, and discusses the current challenges and future perspective.

Advances in nanomaterials for brain microscopy

Jackson T. Del Bonis-O'Donnell[1], Linda Chio[1], Gabriel F. Dorlhiac[1], Ian R. McFarlane[1], and Markita P. Landry[1,2,3,*]

[1] University of California, Berkeley, USA
[2] Innovative Genomics Institute (IGI), USA
[3] Chan-Zuckerberg Biohub, USA

5144–5172



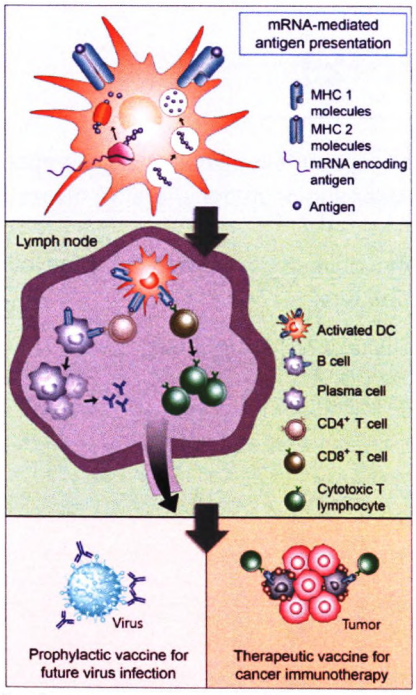
Nanomaterials are providing new insights into the structure and function of the brain. In this review, we summarize the different techniques used in optical microscopy and discuss recent advances in nanomaterials, which are enabling new methods for visualizing the living brain.

Development of mRNA vaccines and their prophylactic and therapeutic applications

Kyuri Lee, Minjeong Kim, Yunmi Seo, and Hyukjin Lee*

Ewha Womans University, Republic of Korea

5173–5192



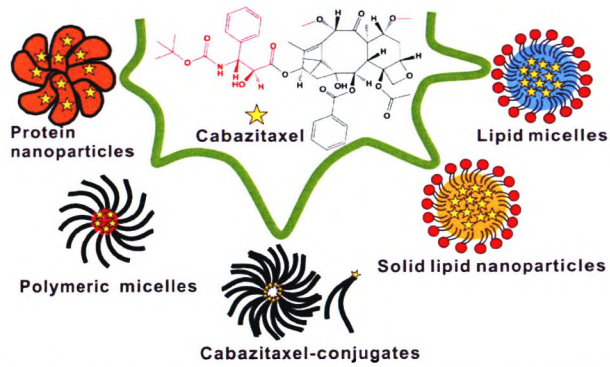
In this article, the recent progresses of messenger RNA (mRNA) vaccines for applications in prophylactic and therapeutic vaccines are explained. It provides an overview of two types of mRNA vaccines (conventional mRNA vaccines, self-amplifying mRNA vaccines) and their prophylactic applications to prevent future virus infections. In addition, therapeutic applications of mRNA vaccines in cancer immunotherapy are described with a brief introduction to cancer immunotherapy.

Current taxane formulations and emerging cabazitaxel delivery systems

Boyang Sun, Robert M. Straubinger, and Jonathan F. Lovell*

University at Buffalo, State University of New York, USA

5193–5218



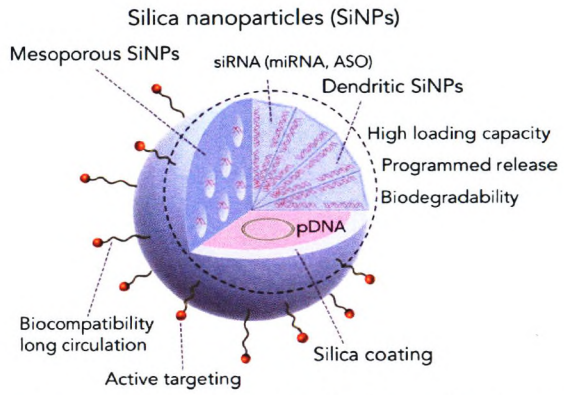
Although first-generation taxanes (i.e., paclitaxel and docetaxel) have sparked broad interest in a variety of promising delivery vehicles, fewer have yet been developed for cabazitaxel, second generation taxane. This review summarizes several clinical-stage approaches for taxane formulation, and recent efforts to develop novel cabazitaxel delivery systems.

Functionalization of silica nanoparticles for nucleic acid delivery

Rimpei Kamegawa, Mitsuru Naito, and Kanjiro Miyata*

The University of Tokyo, Japan

5219–5239



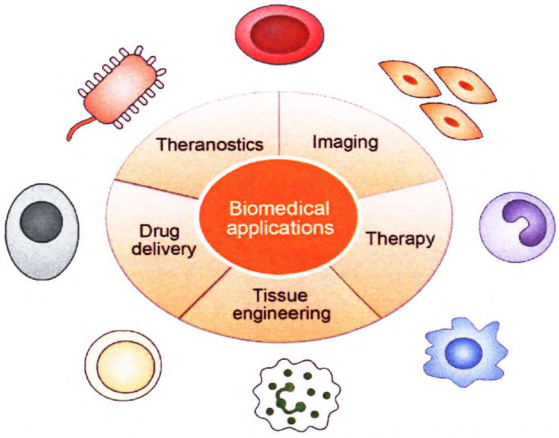
This review discusses the functionalization and performance of silica nanoparticles for nucleic acid delivery with respect to loading and programmed release of nucleic acids, active targeting, endosome escape, and biocompatibility.

Cell-based drug delivery systems for biomedical applications

Teng Li, He Dong, Can Zhang*, and Ran Mo*

China Pharmaceutical University, China

5240–5257



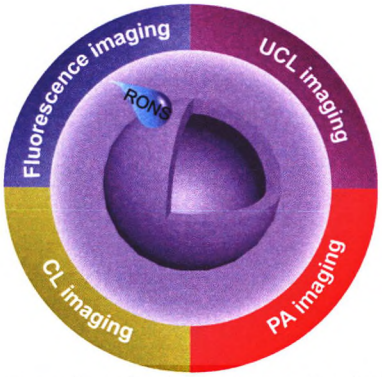
This review presents recent advances in biomedical applications of cell-based drug delivery systems with a focus on drug delivery, tissue engineering, bioimaging, and disease treatment.

Development of optical nanoprobes for molecular imaging of reactive oxygen and nitrogen species

Xu Zhen and Kanyi Pu*

Nanyang Technological University, Singapore

5258–5280



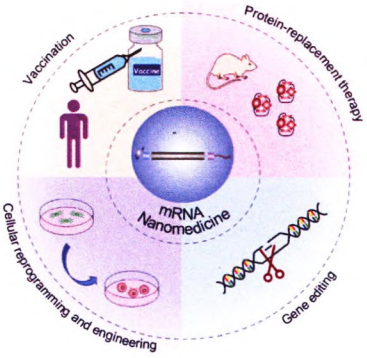
This review summarizes the development of optical nanoprobes that emit near-infrared (NIR) fluorescent, upconversion luminescent (UCL), chemiluminescent (CL), or photoacoustic (PA) signals for molecular imaging of reactive oxygen and nitrogen species (RONS) in living systems.

Biomedical applications of mRNA nanomedicine

Qingqing Xiong[1,2], Gha Young Lee[1], Jianxun Ding[1], Wenliang Li[1,3], and Jinjun Shi[1,*]

[1] Harvard Medical School, USA
[2] Tianjin Medical University Cancer Institute & Hospital, China
[3] Jilin Medical University, China

5281–5309



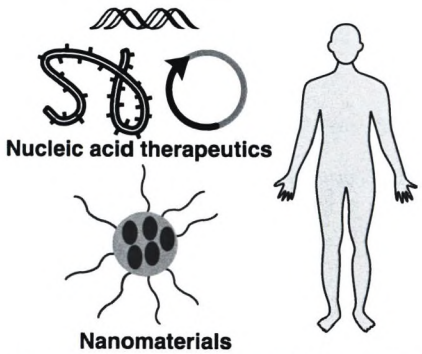
Along with the development of chemical modification strategies and nanotechnology delivery platforms, messenger RNA (mRNA) nanomedicine has recently shown increasingly widespread biomedical applications including vaccination, protein-replacement therapy, gene editing, and cellular reprogramming and engineering.

Design of synthetic materials for intracellular delivery of RNAs: From siRNA-mediated gene silencing to CRISPR/Cas gene editing

Jason B. Miller and Daniel J. Siegwart*

University of Texas Southwestern Medical Center, USA

5310–5337



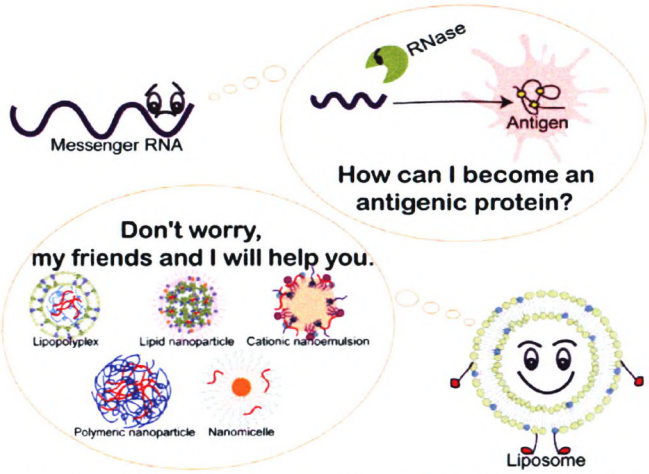
This review describes the design of synthetic nanomaterials with clinical utility to deliver RNA cargos including small RNA (siRNA/miRNA), messenger RNA, and RNAs for non-viral clustered regularly interspaced palindromic repeat (CRISPR)/Cas gene editing.

Recent advances in mRNA vaccine delivery

Lu Tan and Xun Sun*

Sichuan University, China

5338–5354



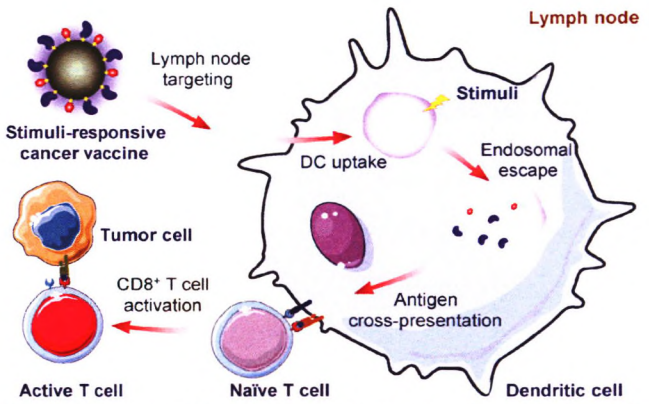
Appropriate delivery systems can improve the limited stability, poor translation efficiency, and cell targeting of messenger RNA (mRNA) vaccines.

Engineering cancer vaccines using stimuli-responsive biomaterials

Yu Zhao, Yugang Guo, and Li Tang*

École polytechnique fédérale de Lausanne (EPFL), Switzerland

5355–5371



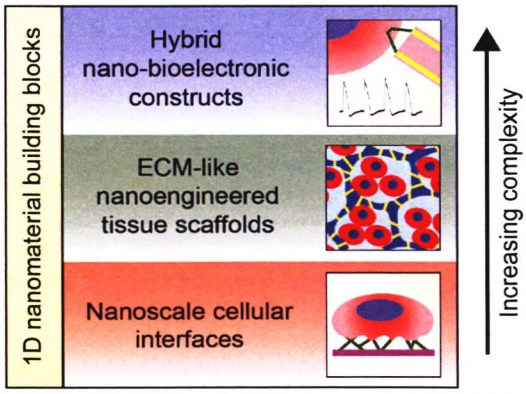
This mini review article summarizes the recent advances in applying stimuli-responsive biomaterials for cancer vaccine delivery. Various stimuli-responsive cancer vaccines for enhanced lymph node targeting and antigen cross-presentation are reviewed and discussed.

Nanobiotechnology: 1D nanomaterial building blocks for cellular interfaces and hybrid tissues

Haitao Liu[1,2], Bilal Haider[1], Holden R. Fried[1], Jie Ju[1], Olurotimi Bolonduro[1], Vineeth Raghuram[1], and Brian P. Timko[1,*]

[1] Tufts University, USA
[2] China University of Geosciences, China

5372–5399



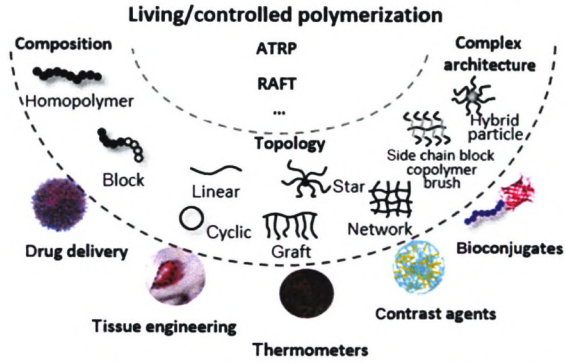
We review one-dimensional (1D) nanomaterials and how they interface with biological systems at various levels of complexity to modulate or monitor cellular function and achieve hybrid tissues.

Temperature-responsive polymers: Synthesis, properties, and biomedical applications

Shenglin Qiao[1,2] and Hao Wang[1,2,*]

[1] National Center for Nanoscience and Technology, China
[2] University of Chinese Academy of Sciences, China

5400–5423



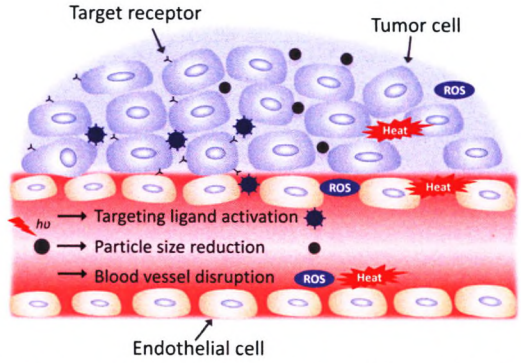
Here, we review the conventional and recently developed polymerization techniques employed for preparing temperature-responsive polymers, summarize various parameters that influence the phase transition behavior of the polymers, and finally demonstrate the potential applications of biocompatible temperature-responsive polymers in the biomedical field.

Phototriggered targeting of nanocarriers for drug delivery

Yafei Li, Yaming Zhang, and Weiping Wang*

The University of Hong Kong, Hong Kong, China

5424–5438



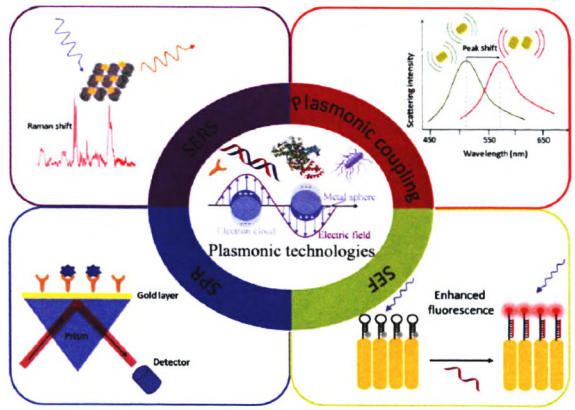
Enhanced targeted drug delivery can be achieved through photo-triggered targeting by three mechanisms: targeting ligand activation, particle size reduction, and blood vessel disruption.

Plasmonic molecular assays: Recent advances and applications for mobile health

Tao Yu and Qingshan Wei*

North Carolina State University, USA

5439–5473



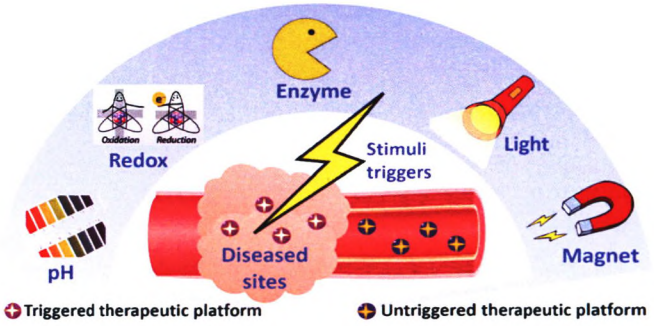
This thematic article of *Nano Research* highlights recent progress in plasmonics-enhanced molecular assays based on the interplay of surface plasmons with various biological species, as well as the applications of these assays in point-of-care diagnostics.

Nanoformulation of metal complexes: Intelligent stimuli-responsive platforms for precision therapeutics

Ming Hu[1], Xiangzhao Ai[1], Zhimin Wang[1], Zhijun Zhang[1], Haolun Cheong[1], Wenmin Zhang[1,2], Jun Lin[3], Juan Li[2], Huanghao Yang[2], and Bengang Xing[1,2,*]

[1] Nanyang Technological University, Singapore
[2] Fuzhou University, China
[3] Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China

5474–5498



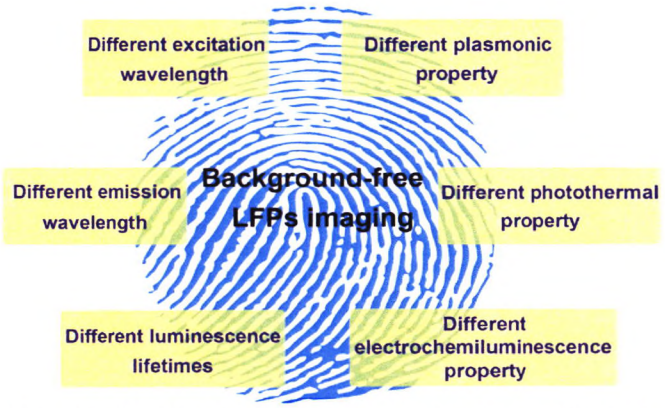
Nanoformulation of metal complexes involves designing of intelligent platforms that respond to environmental stimuli (e.g., pH-gradient, redox conditions, enzyme activation, light irradiation, and magnetic field manipulation) for obtaining precision therapeutics.

Recent progress in background-free latent fingerprint imaging

Yingqian Wang, Jie Wang, Qinqin Ma, Zhihao Li, and Quan Yuan*

Wuhan University, China

5499–5518



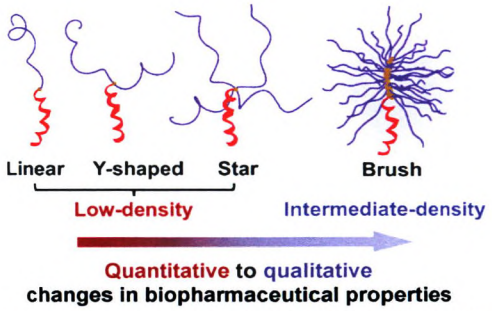
This review is organized around background-free latent fingerprint (LFP) imaging based on the difference in optical properties between contrast agents and background compounds.

PEGylation of therapeutic oligonucletides: From linear to highly branched PEG architectures

Xueguang Lu and Ke Zhang*

Northeastern University, USA

5519–5534



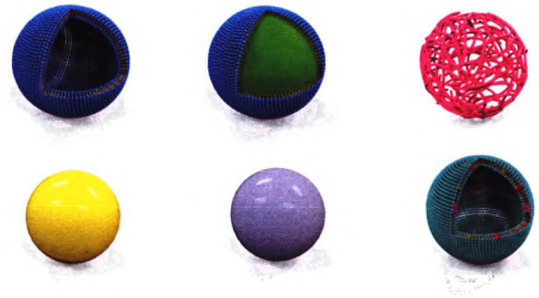
We review recent developments in PEGylated oligonucleotides for therapeutic applications, with a focus on comparing the strengths and limitations of different poly(ethylene glycol) (PEG) architectures.

Delivery systems for theranostics in neurodegenerative diseases

Yan Li[1], Ruiyuan Liu[1,2], Weihong Ji[1,2], Yanhui Li[1], Linying Liu[1,2], and Xin Zhang[1,*]

[1] Institute of Process Engineering, Chinese Academy of Sciences, China
[2] University of Chinese Academy of Sciences, China

5535–5555



This review describes the recent progress in delivery systems, including the use of lipid nanoparticles, polymeric nanoparticles, inorganic nanoparticles, and exosomes for theranostics in neurodegenerative diseases.

Research Articles

Reversible hydrogels with tunable mechanical properties for optically controlling cell migration

Xin Wu[1], Wenmao Huang[1], Wen-Hao Wu[2], Bin Xue[1], Dongfang Xiang[1], Ying Li[3], Meng Qin[1], Fei Sun[4], Wei Wang[1,*], Wen-Bin Zhang[2,*], and Yi Cao[1,*]

[1] Nanjing University, China
[2] Peking University, China
[3] Nanjing University of Information Science & Technology, China
[4] The Hong Kong University of Science and Technology, Hong Kong, China

5556–5565

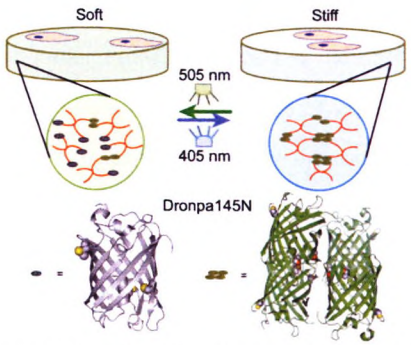


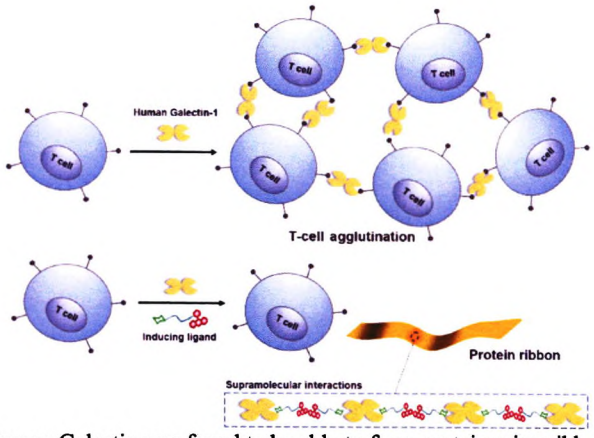
Photo-responsive hydrogels with spatiotemporally tunable mechanical properties were engineered through light controllable association/dissociation of the fluorescent protein Dronpa145N. Such hydrogels, with programmable mechanical history and spatial distribution, may serve as an ideal model system to better understand complex cellular functions.

Self-assembly of Human Galectin-1 via dual supramolecular interactions and its inhibition of T-cell agglutination and apoptosis

Wenjing Qi[1], Yufei Zhang[1], Zdravko Kochovski[2], Jue Wang[1], Yan Lu[2,3], Guosong Chen[1,*], and Ming Jiang[1]

[1] Fudan University, China
[2] Helmholtz-Zentrum Berlin für Materialien und Energie, Germany
[3] University of Potsdam, Germany

5566–5572



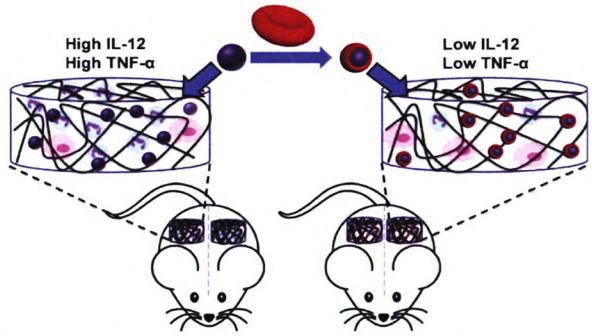
Human Galectin was found to be able to form protein microribbons by protein–carbohydrate interactions and the dimerization of Rhodamine B (RhB). These protein microribbons could multivalently and dynamically compete with accommodate the binding between Human Galectin-1 (Gal-1) and cell receptors and inhibit T-cell agglutination and apoptosis.

Cell membrane coating for reducing nanoparticle-induced inflammatory responses to scaffold constructs

Zhiyuan Fan[1], Peter Y. Li[1], Junjie Deng[1,2], Stephen C. Bady[1], and Hao Cheng[1,*]

[1] Drexel University, USA
[2] Wenzhou Institute of Biomaterials and Engineering, Chinese Academy of Sciences, China

5573–5583



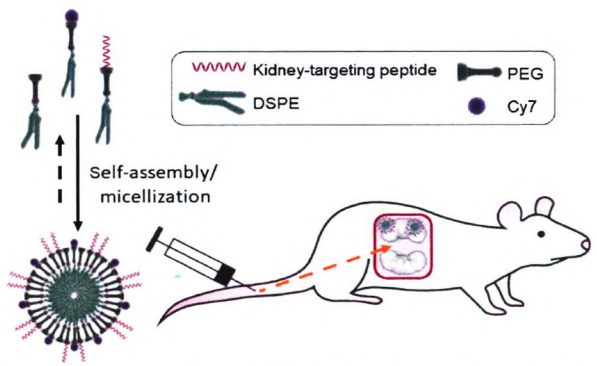
Incorporation of therapeutic-releasing nanoparticles into biomaterial scaffolds has broad applications in tissue regeneration and immune modulation, but may induce excessive inflammatory and foreign body responses to scaffold constructs, limiting their applications. We report a new strategy to harness the natural biocompatibility of cell membranes to eliminate acute inflammatory responses by coating nanoparticle surfaces with red blood cell membranes.

Design and *in vivo* characterization of kidney-targeting multimodal micelles for renal drug delivery

Jonathan Wang, Christopher Poon, Deborah Chin, Sarah Milkowski, Vivian Lu, Kenneth R. Hallows, and Eun Ji Chung*

University of Southern California, USA

5584–5595



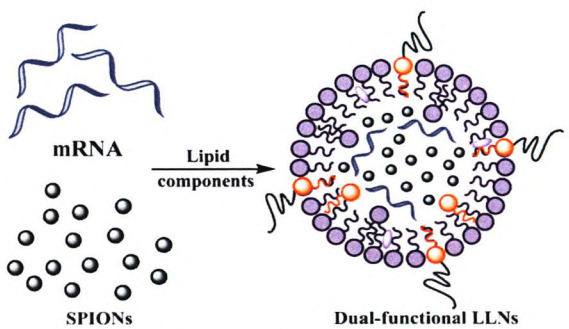
Kidney-targeting multimodal micelles demonstrate enhanced accumulation compared to untargeted controls. Analysis of nanoparticle distribution show tubular cell colocalization within the nephron of the kidney.

Co-delivery of mRNA and SPIONs through amino-ester nanomaterials

Xiao Luo, Weiyu Zhao, Bin Li, Xinfu Zhang, Chengxiang Zhang, Anna Bratasz, Binbin Deng, David W. McComb, and Yizhou Dong*

The Ohio State University, USA

5596–5603



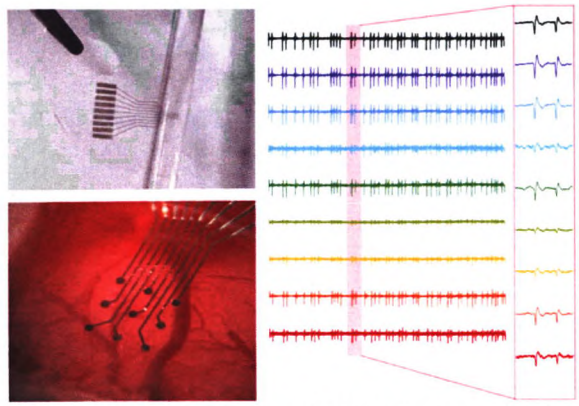
Messenger RNA (mRNA) and superparamagnetic iron oxide nanoparticles (SPIONs) were co-encapsulated into amino-ester nanomaterials, which displayed dual functions both *in vitro* and *in vivo*.

Flexible and biocompatible nanopaper-based electrode arrays for neural activity recording

Yichuan Guo[1,2], Zhiqiang Fang[3], Mingde Du[1,2], Long Yang[4], Leihou Shao[1,2], Xiaorui Zhang[1,2], Li Li[1,2], Jidong Shi[1,2], Jinsong Tao[3], Jinfen Wang[1,2], Hongbian Li[1,2,*], and Ying Fang[1,2,5,*]

[1] National Center for Nanoscience and Technology, China
[2] University of Chinese Academy of Sciences, China
[3] South China University of Technology, China
[4] University of California, Los Angeles, USA
[5] CAS Center for Excellence in Brain Science and Intelligence Technology, China

5604–5614



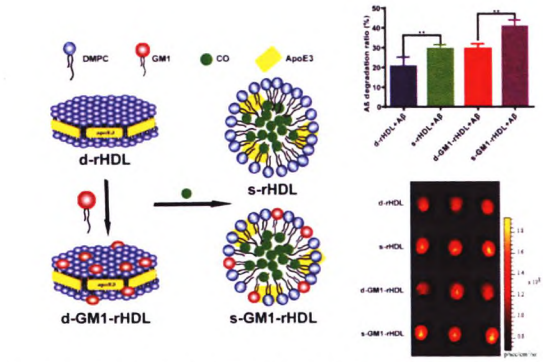
Flexible and biocompatible neural electrode arrays based on a nanopaper substrate have been developed. These electrode arrays exhibit high sensitivity and stability in long-term brain activity recording.

The shape effect of reconstituted high-density lipoprotein nanocarriers on brain delivery and Aβ clearance

Huahua Song[1], Xinyi Ma[1], Jianrong Xu[1], Qingxiang Song[1], Meng Hu[1], Xiao Gu[1], Qian Zhang[1], Lina Hou[1], Lepei Chen[1], Yukun Huang[2], Ping Yu[1], Dayuan Wang[1], Gan Jiang[1], Meng Huang[1], Jun Chen[2], Hongzhuan Chen[1,*], and Xiaoling Gao[1,*]

[1] Shanghai Jiao Tong University, China
[2] Fudan University, China

5615–5628



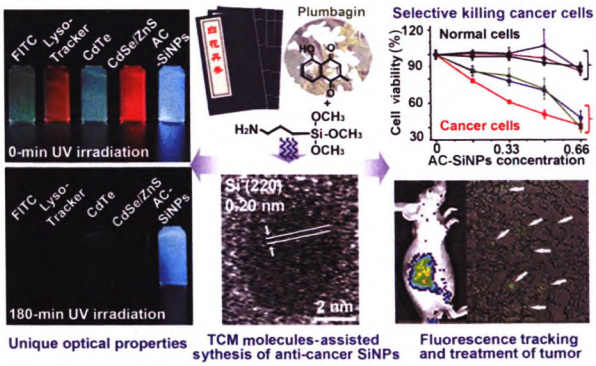
Here, we constructed two discoidal reconstituted high-density lipoprotein (rHDL) nanocarriers (d-rHDL and d-GM1-rHDL) and two spherical rHDL nanocarriers (s-rHDL and s-GM1-rHDL) and for the first time demonstrated the shape effect of rHDL nanocarriers on their brain delivery and amyloid β clearance capacity.

Traditional Chinese medicine molecule-assisted chemical synthesis of fluorescent anti-cancer silicon nanoparticles

Xiaoyuan Ji, Daoxia Guo, Bin Song, Sicong Wu, Binbin Chu, Yuanyuan Su, and Yao He*

Soochow University, China

5629–5641



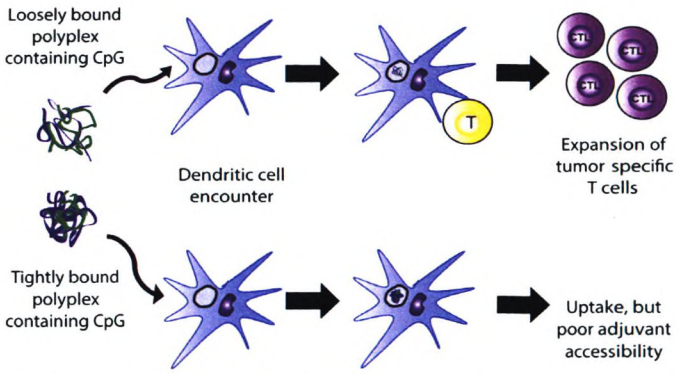
A novel traditional Chinese medicine (TCM)-assisted chemical synthetic strategy is introduced for the one-pot synthesis of small-sized water-dispersed anti-cancer (AC)-silicon nanoparticles (SiNPs), which simultaneously possess robust fluorescence, excellent storage stability, and more interestingly, intrinsic anti-cancer efficacy with good selectivity towards cancer cells. Furthermore, the as-prepared AC-SiNPs are further employed for synergistic fluorescence bioimaging and treatment of tumors.

Polyplex interaction strength as a driver of potency during cancer immunotherapy

Shannon J. Tsai[1], James I. Andorko[1], Xiangbin Zeng[1], Joshua M. Gammon[1], and Christopher M. Jewell[1,2,3,4,*]

[1] University of Maryland, USA
[2] Maryland VA Health Care System, USA
[3] University of Maryland Medical School, USA
[4] Marlene and Stewart Greenebaum Cancer Center, USA

5642–5656



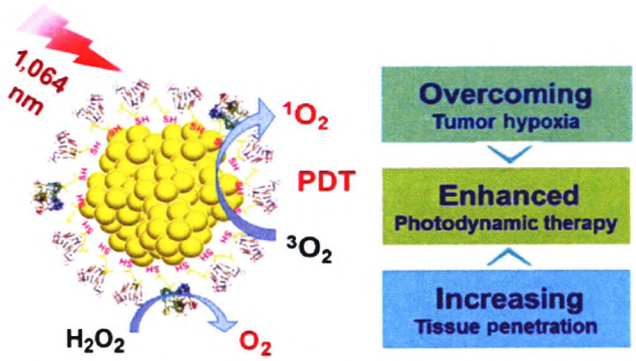
The interaction strength within polyplexes between a molecular adjuvant (CpG) and a degradable polycation (poly(β-amino ester), PBAE) is dependent on the ratio of these components during assembly. The interaction strength impacts the uptake and processing of the CpG, and the resulting immune response during activation of antigen presenting cells, expansion of tumor-specific T cells, and tumor immunotherapy.

NIR-II light activated photodynamic therapy with protein-capped gold nanoclusters

Qian Chen[1], Jiawen Chen[1], Zhijuan Yang[1], Lin Zhang[2], Ziliang Dong[1], and Zhuang Liu[1,*]

[1] Soochow University, China
[2] The First Affiliated Hospital of Soochow University, China

5657–5669



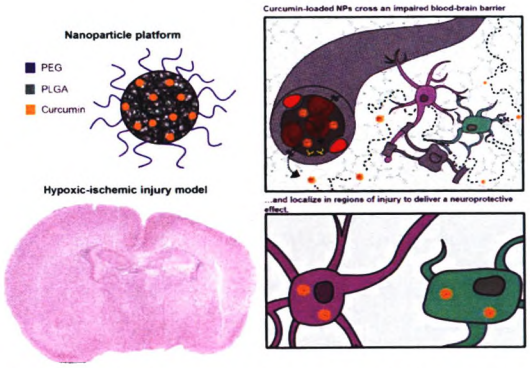
A new type of photosensitizing nano-agent that simultaneously enables *in vivo* fluorescence imaging, tumor hypoxia relief, and the second near-infrared window (NIR-II) light-induced *in vivo* photodynamic therapy (PDT) of cancer was developed.

Curcumin-loaded polymeric nanoparticles for neuro-protection in neonatal rats with hypoxic-ischemic encephalopathy

Andrea Joseph, Thomas Wood, Chih-Chung Chen†, Kylie Corry, Jessica M. Snyder, Sandra E. Juul, Pratik Parikh, and Elizabeth Nance*

University of Washington, USA
† Present address: University of Illinois at Urbana-Champaign, USA

5670–5688



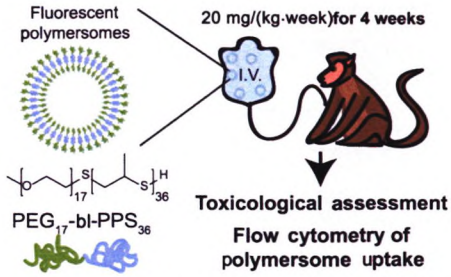
Curcumin-loaded brain-penetrating nanoparticles can cross the impaired blood-brain barrier following systemic administration in a neonatal hypoxia-ischemia rat model. The brain-penetrating nanoparticles localize in regions of injury and release curcumin to provide a neuroprotective effect, expanding the number of clinically-relevant therapeutic interventions for the treatment of neonatal hypoxic-ischemic encephalopathy.

Polymersomes scalably fabricated via flash nanoprecipitation are non-toxic in non-human primates and associate with leukocytes in the spleen and kidney following intravenous administration

Sean D. Allen[1], Yu-Gang Liu[1], Sharan Bobbala[1], Lei Cai[2], Peter I. Hecker[2], Ryan Temel[2], and Evan A. Scott[1,*]

[1] Northwestern University, USA
[2] University of Kentucky, USA

5689–5703



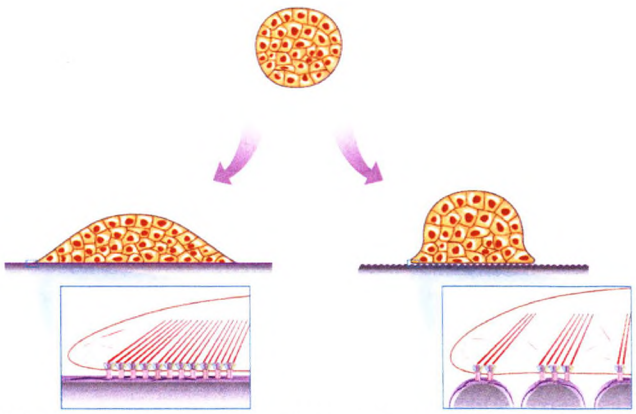
Poly(ethylene glycol)-block-poly(propylene sulfide) (PEG-bl-PPS) polymersomes formed by flash nanoprecipitation were found to be non-toxic after repeated intravenous administration in non-human primates. Polymersomes were taken up by antigen-presenting cell subsets in the liver, kidneys, and spleen of treated cynomolgus monkeys.

Engineering subcellular-patterned biointerfaces to regulate the surface wetting of multicellular spheroids

Luying Wang[1,3], Pingqiang Cai[4], Jing Luo[2,3], Feilong Zhang[1,3], Jian Liu[2], Yupeng Chen[2,3], Zhongpeng Zhu[2,3], Yongyang Song[2,3], Bingquan Yang[2], Xi Liu[2,3], Xiaodong Chen[4], and Shutao Wang[2,3,*]

[1] Institute of Chemistry, Chinese Academy of Sciences, China
[2] Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China
[3] University of Chinese Academy of Sciences, China
[4] Nanyang Technological University, Singapore

5704–5715



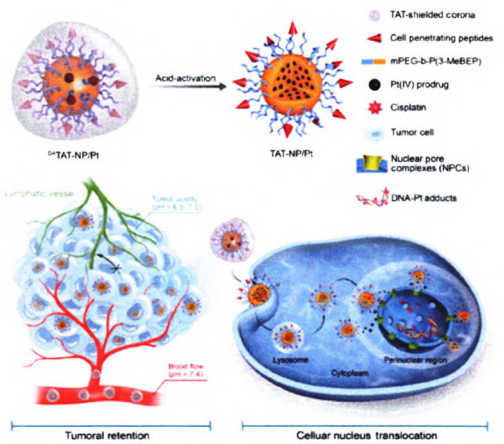
Subcellular-patterned biointerfaces were employed to inhibit the surface wetting of multicellular spheroids.

Acidity-triggered TAT-presenting nanocarriers augment tumor retention and nuclear translocation of drugs

Wei Jiang[1], Jilong Wang[1], Jinbin Yang[2], Zhiwei He[1], Zhenhui Hou[1], Yingli Luo[1], Li Wang[1], Jing Liu[1], Houbing Zhang[1], Yangyang Zhao[1], Guoqing Zhang[1], Fang Huang[1], Xuechang Zhou[2], Lifeng Yan[1,*], Xianzhu Yang[3,*], Yucai Wang[1,*], and Jun Wang[3]

[1] University of Science and Technology of China, China
[2] Shenzhen University, China
[3] South China University of Technology, China

5716–5734



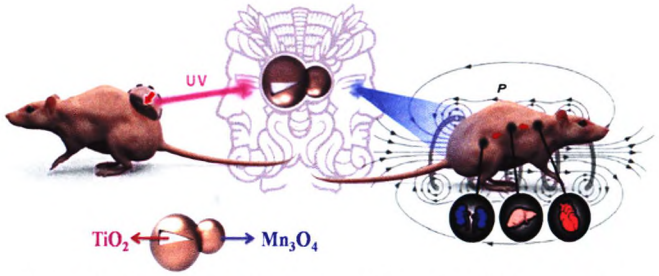
A transactivator of transcription (TAT)-presenting nanomedicine, apart from improving tumor accumulation and cellular uptake, can simultaneously enhance tumor retention and promote nuclear translocation of the encapsulated platinum prodrugs, and thus improve therapeutic efficacy.

A facile fabrication route for binary transition metal oxide-based Janus nanoparticles for cancer theranostic applications

M. Zubair Iqbal[1], Wenzhi Ren[1], Madiha Saeed[1], Tianxiang Chen[1], Xuehua Ma[1], Xu Yu[1], Jichao Zhang[2], Lili Zhang[2], Aiguo Li[2], and Aiguo Wu[1,*]

[1] Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China
[2] Shanghai Institute of Applied Physics, Chinese Academy of Sciences, China

5735–5750



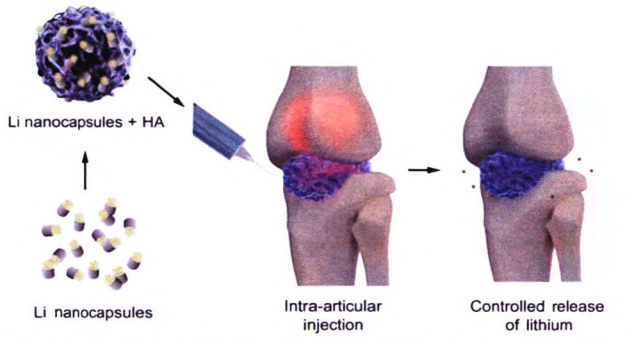
A unique liquid-phase method was employed to fabricate Mn_3O_4-TiO_2/ZnO/Fe_3O_4 multifunctional binary transition metal oxide-based Janus nanoparticles, using the concept of epitaxial growth and lattice mismatch among synthesized materials. These multifunctional Mn_3O_4-TiO_2 Janus nanoparticles enhance T_1-weighted magnetic resonance imaging contrast in the heart, liver, and kidneys and show excellent tumor ablation in photodynamic therapy.

LiF@SiO_2 nanocapsules for controlled lithium release and osteoarthritis treatment

Trever Todd[1], Zhenhui Lu[2], Jinmin Zhao[2], Benjamin Cline[1], Weizhong Zhang[1], Hongmin Chen[1,3], Anil Kumar[1], Wen Jiang[1], Franklin West[1], Samuel Franklin[1], Li Zheng[2,*], and Jin Xie[1,*]

[1] University of Georgia, USA
[2] The First Affiliated Hospital of Guangxi Medical University, China
[3] Xiamen University, China

5751–5760



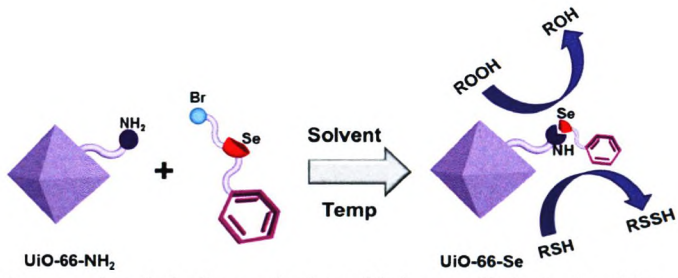
Controlled lithium delivery for efficient osteoarthritis therapy is described. We use a LiF nanocrystal as a lithium reservoir, silica coating to control the lithium release rate, and hyaluronic acid as the delivery medium. The sustained lithium release elicits broad inhibition of osteoarthritis-related catabolic markers, leading to effective protection of cartilage.

Selenium-functionalized metal-organic frameworks as enzyme mimics

Weiqiang Zhou[1,2], Hongfeng Li[1], Bin Xia[1], Wenlan Ji[1], Shaobo Ji[2], Weina Zhang[1], Wei Huang[1,*], Fengwei Huo[1,*], and Huaping Xu[2,*]

[1] Nanjing Tech University (Nanjing Tech), China
[2] Tsinghua University, China

5761–5768



A general and facile method to fabricate efficient glutathione peroxidase (GPx) mimics has been developed by grafting selenium-containing molecules (phenylselenylbromide, PhSeBr) to a of Zr(IV)-based $UiO\text{-}66\text{-}NH_2$ framework. The as-prepared UiO-66-Se systems show good catalytic activity over three cycles. The high-efficiency GPx mimic metal-organic frameworks (MOFs) are endowed with excellent thermal and structural stability, providing a promising avenue for the development of artificial enzyme mimics.

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