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**Prof. Dr. Karthik Kumar**

**Scientific Patents, Publications and Presentations**

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- 2016                    A process for creating lithographically-defined plasmonic structures with enhanced Q-factors.  
US Patent 9,233,393. Inventors: J. K. W. Yang, M. Bosman, H. Duan, K. Kumar, I. Y. Phang
- 2015                    Selective (Bio) Functionalization of Solid-State Nanopores  
M Pla-Roca and K. Kumar et al., ACS Applied Materials and Interfaces **7**(11), 6030-6035
- 2014                    Three dimensional plasmonic stereoscopic prints in full colour  
X. M. Goh, and K. Kumar et al. Nature Communications **5**, 5361
- Plasmonic Color Palettes for Photorealistic Printing with Aluminum Nanostructures  
S.J. Tan, and K. Kumar et al., Nano Letters **14**(7), 4023-4029
- An optical arrangement and a method of forming the same  
SG Patent App. 11,201,400,497 W, Inventors: H. Duan, K. Kumar, J.K.W. Yang,
- 2013                    Embedded plasmonic nanomenhirs as location-specific biosensors  
K. Kumar, A.B. Dahlin, T. Sannomiya, S. Kaufmann, L. Isa, E. Reimhult, Nano Letters **13**(12), 6122-6129
- Method of writing to an optical storage medium, method of reading from an optical data storage medium, and optical data storage medium  
US Patent App. 14/039,044, Inventors: K. Kumar, J.K.W. Yang, H. Duan, M. Asbahi
- Electrically driven nanopillars for THz quantum cascade lasers  
M. I. Amanti and K. Kumar et al. Optics Express, **21**(9), pp. 10917-10923
- Method of detecting defects in periodic arrays using plasmon resonances  
Tech Disclosure: ETPL ref: IMR/Z/07842, Inventors: W. P. Goh , J. K. W. Yang, K. Kumar





2012

### Ultra-high Resolution Color Printing

Oral Presentation at the 38<sup>th</sup> International Conference on Micro- and Nanoengineering, Toulouse, France

### Printing Colour at the Optical Diffraction Limit

K. Kumar et al., *Nature Nanotechnology*, **7**, 557–561

### High density plasmonic optical data storage

SG Patent Application No. 201207248-4, Priority Date: 28 September 2012, Inventors: K. Kumar, J. K. W. Yang, H. Duan, M. Asbahi

### A process for creating lithographically-defined plasmonic structures with enhanced Q-factors.

US Patent App. 13/847,193. Priority Date: 19 March 2012 Inventors: J. K. W. Yang, M. Bosman, H. Duan, K. Kumar, I. Y. Phang

### Lithographically Designed Nanostructures for Color Plasmonics

Invited Oral Presentation at the 2<sup>nd</sup> Molecular Materials Meeting, Singapore 2012

2011

### Direct and reliable plasmonic nanostructures with sub-10 nm gaps

H. Duan and K. Kumar et al. *ACS Nano*, **5**(9): 7593-7600

### Formation of nanopore-spanning lipid bilayers through liposome fusion.

K. Kumar and E. Reimhult et al. *Langmuir*, **27**(17), pp 10920–10928

### Sensing lipid structures using plasmonic asymmetric nanomenhirs

Oral presentation at the International Conference on Materials for Advanced Technologies, Singapore, 2011

### Nanomenhirs for surface-based biosensing of lipid structures

Oral presentation at the 55<sup>th</sup> International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication, Las Vegas, Nevada, USA, 2011

### Preparation and dynamic patterning of supported lipid membranes mimicking cell membranes





S.Kaufmann, K.Kumar et.al. Methods in Molecular Biology: Bioconjugation Protocols, **751**: 453-463

2010

Treatise on the formation and sensing of lipid structures on nanofabricated arrays.

PhD Thesis, Department of Materials, ETH Zurich. Defended on 11.10.2010, accepted on 23.12.2010.

Asymmetric nanoplasmonic structures for dual sensing (T-10-073).

European patent app. EP10013193.7, priority date 01.10.2010.

Particle lithography from colloidal self-assembly at liquid-liquid interfaces (SALI)

L. Isa, K. Kumar et al. ACS Nano, **4**(10): 5665-5670.

Advances in nanopatterned and nanostructured supported lipid membranes and their applications

E. Reimhult, K. Kumar et.al. Biotechnology and Genetic Engineering Reviews, **27**:185-216.

Imaging and sensing of nanopore-spanning lipid bilayers

Poster presentation at the 3<sup>rd</sup> International Nano Bio Conference, Zurich Switzerland.

2009

Formation of supported lipid bilayers on indium tin oxide for patterning applications.

K. Kumar, E. Reimhult, et al. Lab on a Chip, **9**: 718-725.

A detailed investigation of the formation kinetics and layer structure of poly(ethylene glycol) tether supported lipid bilayers.

S. Kaufmann, K. Kumar et al. Soft Matter, **5**, pp 2804-2814.

Seeing nanopore-spanning supported lipid bilayers

Oral presentation at the American Vacuum Society 56<sup>th</sup> International Symposium and Exhibition, San Jose, USA.

2008

Membrane biosensor platforms using nano- and microporous supports.

E. Reimhult and K. Kumar. Trends in Biotechnology **26**(2): 82-89.

Spanning Supported Lipid Bilayers on Porous Silicon Nitride for Multi-technique Membrane Sensing

Oral presentation at the American Vacuum Society 55<sup>th</sup> International Symposium and Exhibition, Boston, USA.





Spanning supported lipid bilayers on porous silicon nitride for multi-technique membrane sensing

Poster presentation at the Gordon Research Conference for Biointerface Science, Aussois, France.

Fusing liposomes on porous silicon nitride for multi-technique membrane sensing.

Poster presentation at the German Society for Biophysics Meeting, Gomadingen, Germany.

2007

Fabrication of nanoporous silicon nitride and silicon oxide films of controlled size and porosity for combined electrochemical and waveguide measurements.

E. Reimhult, K. Kumar, et al. *Nanotechnology* **18**(27): 7.

Site-specific Sorting of Proteoliposomes by Size and Functionality for High Density Parallel Screening of Membrane Receptor Functions.

Poster presentation at the European Science Foundation Research Conference on Biological Surfaces and Interfaces, San Feliu de Guixols, Spain.

Site-Specific Sorting of Proteoliposomes for High Density Parallel Screening of Membrane Receptor Function.

K. Kumar, E. Reimhult et al. Poster presentation at the BIOSURF VII, ETH Zürich, Switzerland.

2006

Novel surface architectures for the electrochemical investigation and manipulation of lipid membranes.

Oral Presentation at the 4<sup>th</sup> International Society for Electrochemistry Spring Meeting, Singapore.

