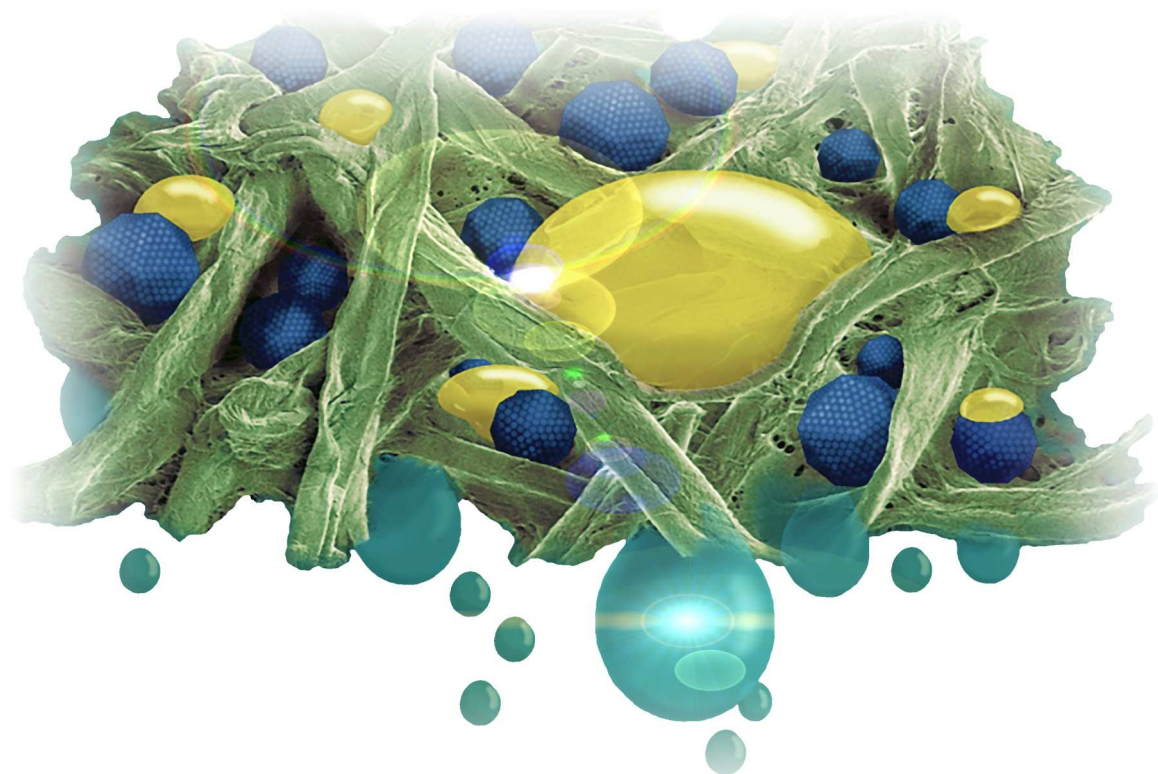


# ADVANCED FILTRATION AND ANTIMICROBIAL TECHNOLOGIES



## METAL NANOPARTICLES

AGAINST BIOFOULING AND FOR CONTAMINANT REMOVAL



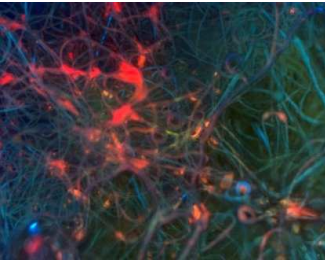
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# FILTERS AND MEMBRANES WITH ANTIMICROBIAL PROPERTIES

## ANTIBACTERIAL/ANTIFOULING TREATMENT OF A VARIETY OF MATERIALS



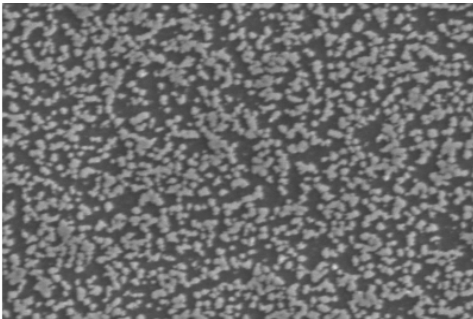
Fluorescent verification  
of antimicrobial activity

### CHARACTERISTICS OF Ag-MODIFIED FILTRATION MATERIALS

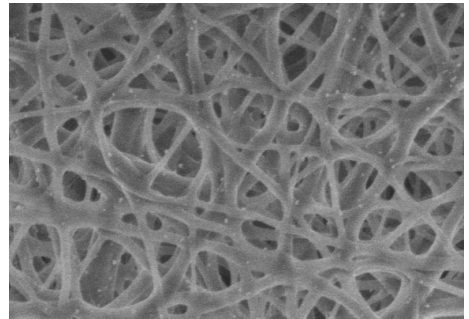
- > Patented technology\* of covalent immobilization of Ag nanoparticles on solid surfaces
- > Universal deposition on substrates of different shapes
- > Software controlled process of functionalization (with numerous adjustable parameters)
- > Functionalization of dense fibre systems in entire thickness
- > Exhibit unique antibacterial/ antifouling properties
- > Functionalization of micro-/nano structured membranes and filters
- > Controllable release of Ag nanoparticles

### EXAMPLE OF ANTIMICROBIAL TREATMENT

#### FUNCTIONALIZATION OF FLAT MEMBRANES



#### FUNCTIONALIZATION OF NANO-STRUCTURED MEMBRANES



### COVALENT ANTIMICROBIAL MODIFICATION OF FIBRE FILTERS BY Ag NANOPARTICLES



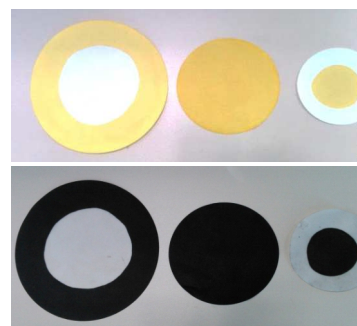
\* Patent No. CZ303502 (B6) Immobilization method of silver nanoparticles to solid substrates  
Paper: Antifungal activity of silver nanoparticles against *Candida* spp. By: Panacek, Ales; Kolar, Milan; Vecerova, Renata; et al. *BIOMATERIALS* Volume: 30 Issue: 31 Pages: 6333-6340 Published: NOV 2009

# REACTIVE FILTERS FOR CONTAMINANT REMOVAL

## FILTRATION FIBRE MATERIALS FUNCTIONALIZED WITH ZERO-VALENT IRON NANOPARTICLES

### CHARACTERISTICS OF Fe<sup>0</sup>-FUNCTIONALIZED FILTRATION MATERIALS

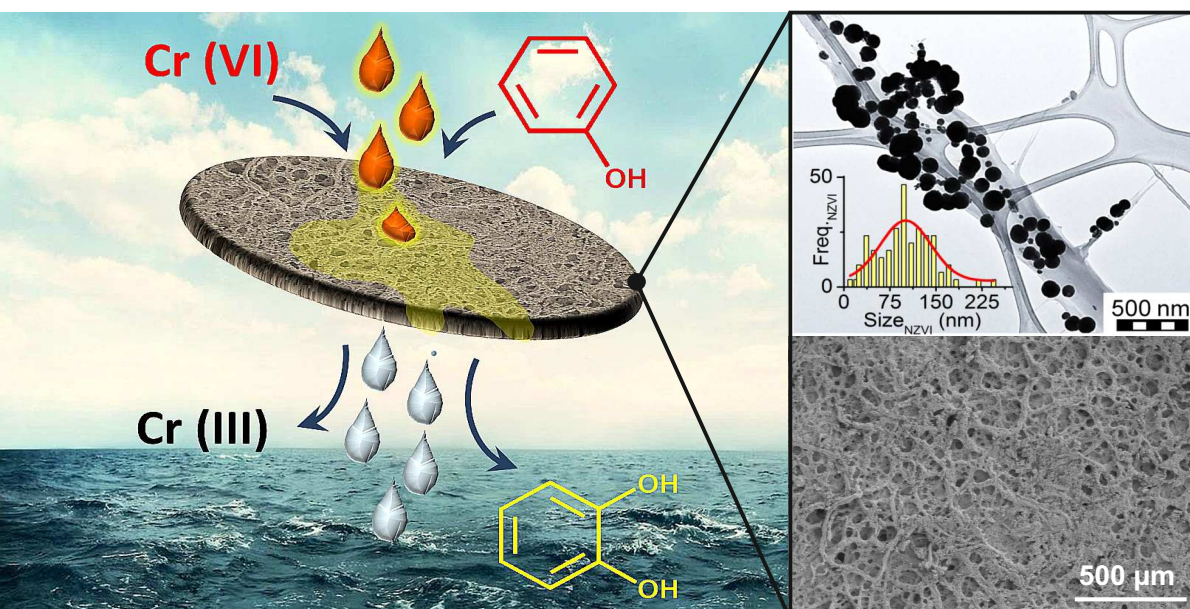
- > Patented technology\* of fibre-filters functionalization
- > Functionalization of any type of fibre filters/membranes
- > Functionalized magnetic filters/membranes are highly-efficient for contaminant removal (metals, reducible organic compounds)
- > Filters are air-stable and patternable upon request
- > Possibility to combine reductive properties of Fe<sup>0</sup> nanoparticles with antimicrobial activity of Ag nanoparticles (i.e., bimetallic Ag-Fe functionalization)
- > Loading of metal nanoparticles can be tailored to particular application
- > Environmental friendly filtration technology
- > Effective, affordable, sustainable filtration technology



Example of patterned filters

### EXAMPLE OF FILTER MODIFICATION

Fe<sup>0</sup> nanoparticles on cellulose filters forming magnetically active membrane hybrids, showing high activity towards the removal of Cr<sup>6+</sup> and an excellent catalytic ability to convert phenols into catechol, by simple filtration processes.



\* European Patent No. 14184322.7-1352

K. K. R. Datta, E. Petala, K. J. Datta, J. Perman, J. Tucek, P. Bartak, G. Zoppellaro, M. Otyepka, R. Zbořil, Chem. Commun., 2014, 50, 15673-15676



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