

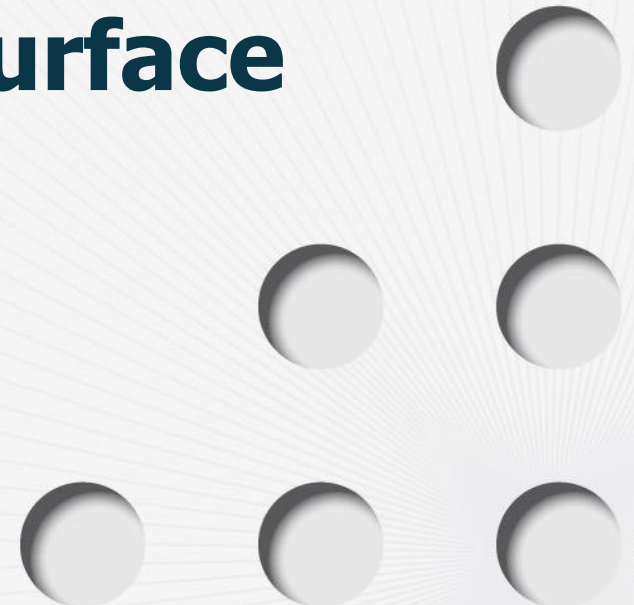


Workshop of Photonics

# Twisted Fields For Surface Texturing

Dr. Antanas Urbas

EPIC Online Technology Meeting on Surface Structuring  
April 27th

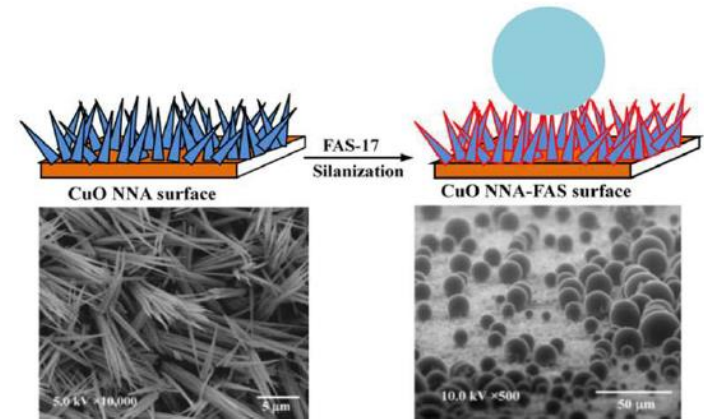




# Texturing For Hydro(phili)phobicity

Plenty of methods to make a surface hydro(phili)phobic:

- (Electro)chemical coating, e.g. oxidizing



F.Xiao e.a.

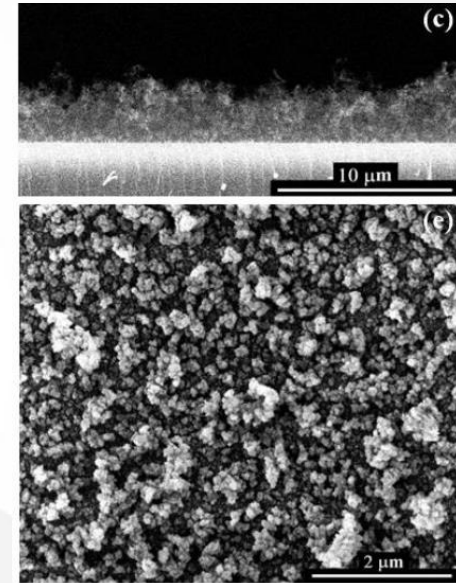
DOI: 10.1039/C4TA05730A



# Texturing For Hydro(phili)phobicity

Plenty of methods to make a surface hydro(phili)phobic:

- (Electro)chemical coating, e.g. oxidizing
- Plasma enhanced vapor deposition



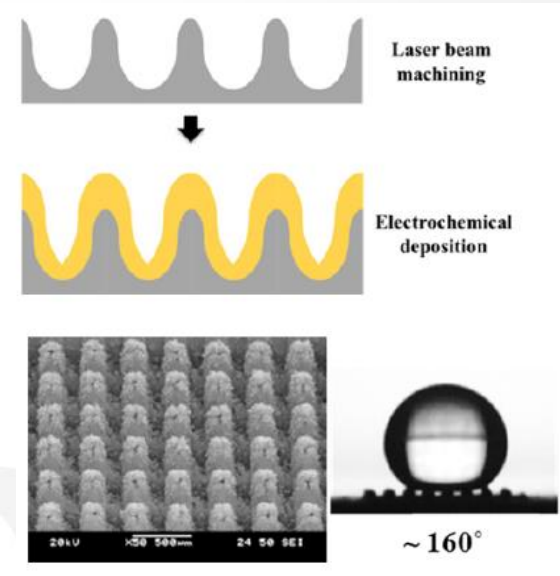
Sukrit Thongrom e.a.  
IOP Conf. Ser.: Mater. Sci. Eng. 3  
2018



# Texturing For Hydro(phili)phobicity

Plenty of methods to make a surface hydro(phili)phobic:

- (Electro)chemical coating, e.g. oxidizing
- Plasma enhanced vapor deposition
- Laser ablation + coating



Min Ho Kwon e.a.

DOI: 10.1007/s12541-015-0115-0

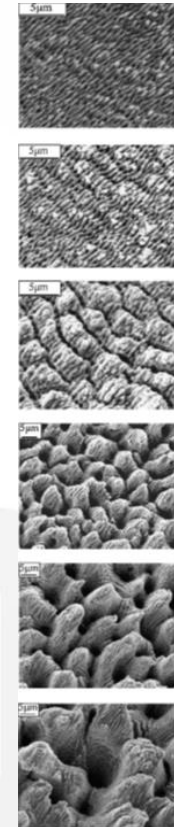
2015



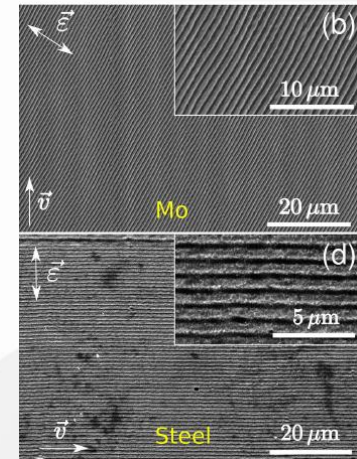
# Texturing For Hydro(phili)phobicity

Plenty of methods to make a surface hydro(phili)phobic:

- (Electro)chemical coating, e.g. oxidizing
- Plasma enhanced vapor deposition
- Laser ablation + coating
- Ripples by laser pulse
- FS lasers are good at above exercise
- Achieved pattern corresponds to beam features like intensity and polarization
- Ripples may come from surface plasmons that are generated in areas with intensity above threshold (sharp peaks are welcome!)
- Want regular or irregular, high or low aspect ratio – choose beam pattern

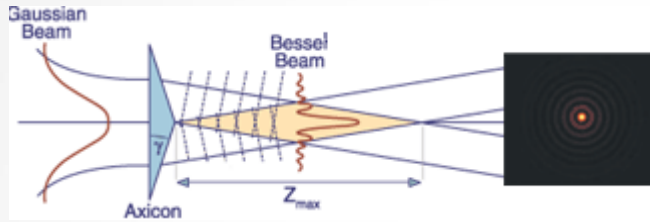


Bo Wu e.a.  
App.Surf.Sci  
2009

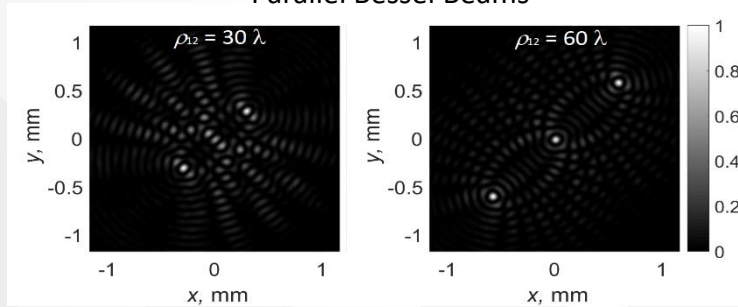


Bulgakova e.a.  
Nature Sci.Rep.  
2017

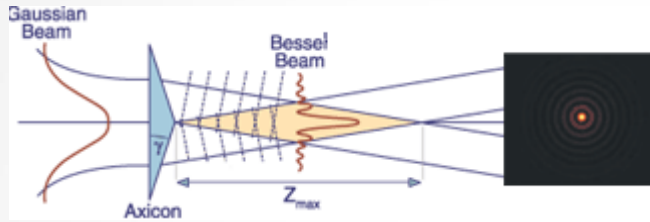
# Exotic Patterns By Non-diffracting Beams



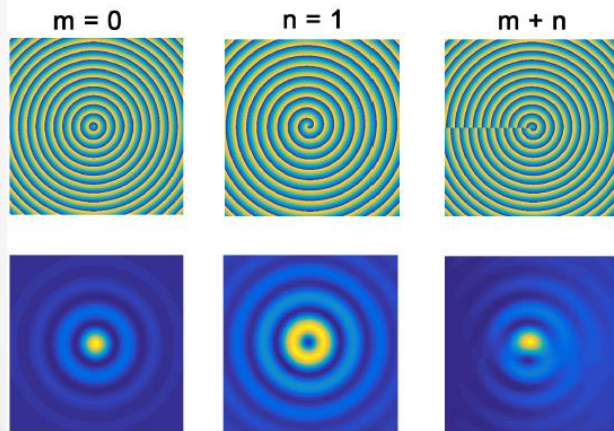
Parallel Bessel Beams



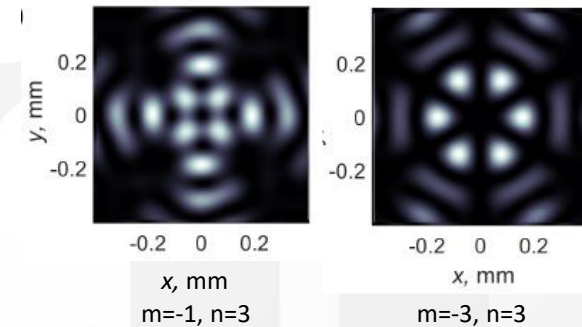
# Exotic Patterns By Non-diffracting Beams



Superposition of topological charges  $m$  and  $n$



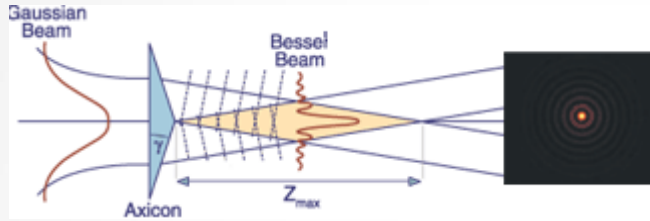
Superposition



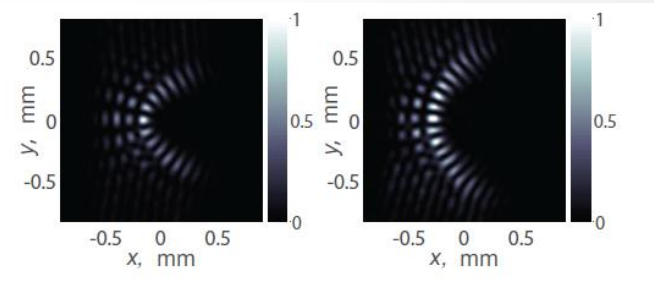




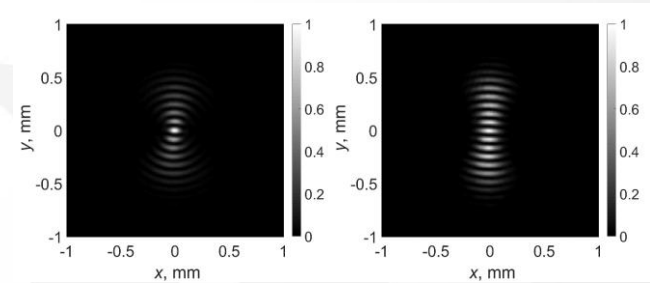
# Exotic Patterns By Non-diffracting Beams



Other symmetries



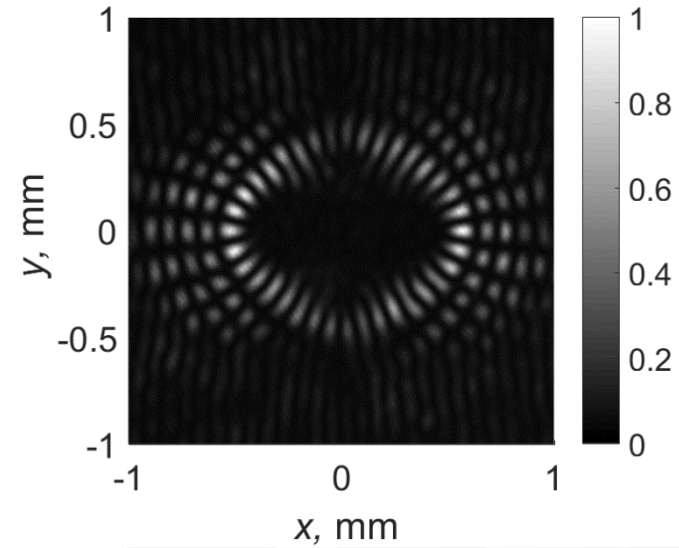
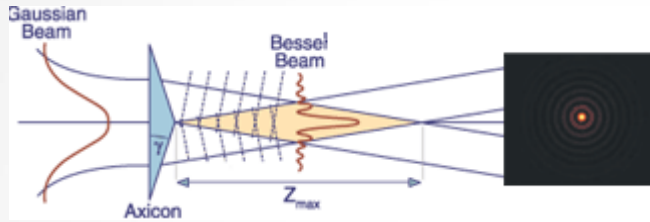
Parabolic (Weber beam) with divergence factor  $a=3$  left,  $a=9$  right



Elliptic (Mathieu beam) with ellipticity factor  $q=3$  left,  $q=27$  right

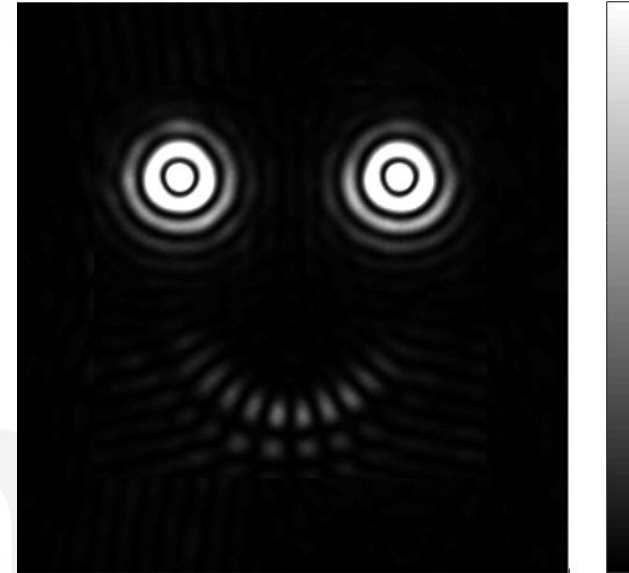
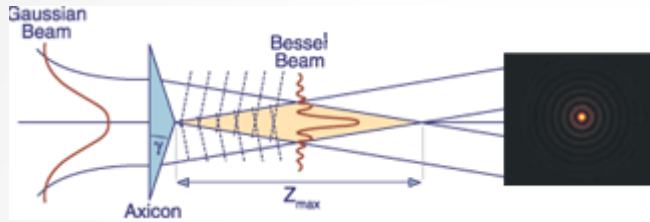


# Exotic Patterns By Non-diffracting Beams



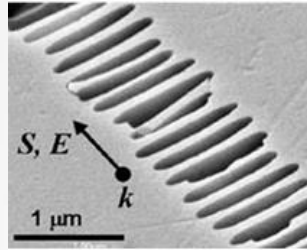
Parallel Weber beams

# Exotic Patterns By Non-diffracting Beams

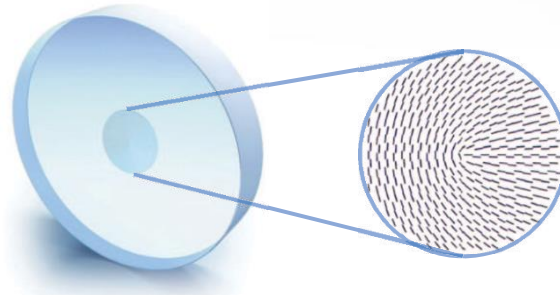




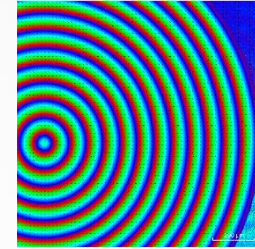
# How We Create Patterns



Self Organized Structures

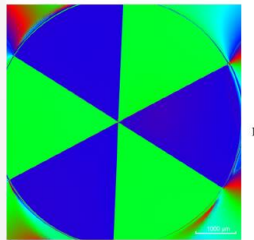


Inscription in fused silica



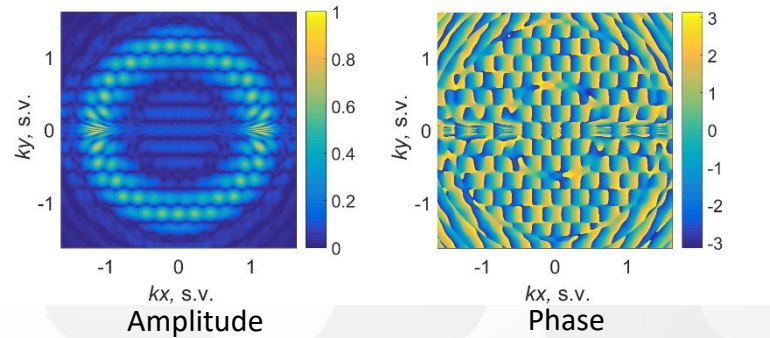
Controlled Fast Axis Position

Mask for  $m=-3, n=3$



Fast Axis

Mask for Happy Face





# Thank you!