

# Imaging Striatal Dopamine with a Synthetic Near-Infrared Nanosensor



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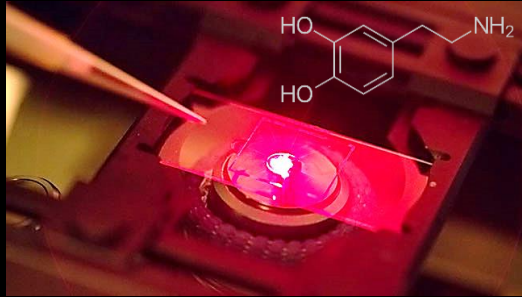
[landrylab.com](http://landrylab.com)



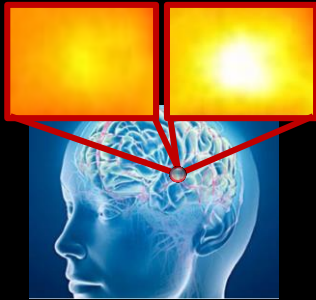
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# LANDRY LAB

## NEUROTRANSMITTER IMAGING



19.80 s

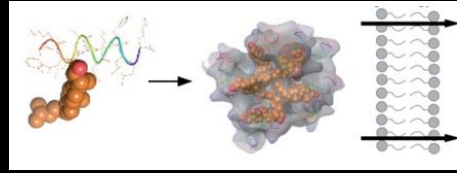


0.12  
 $\Delta F/F$   
0.0

10  $\mu\text{m}$

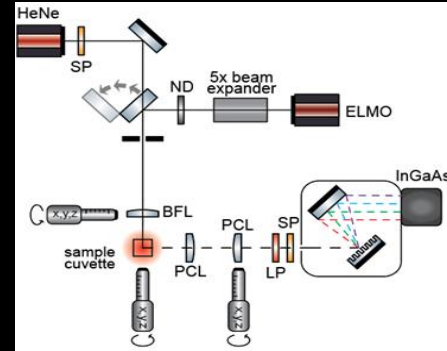
Beyene *et al.* *ACS Chem Neuro* 2017  
Beyene *et al.* *Science Advances* 2019  
Jeong *et al.* *Science Advances* 2019

## MEMBRANE INTERNALIZATION



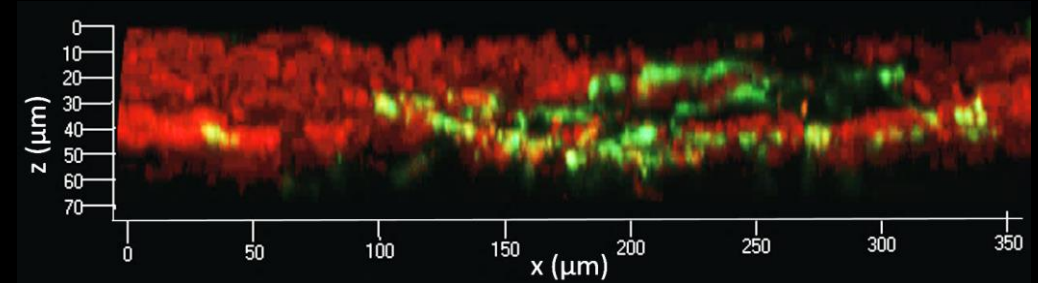
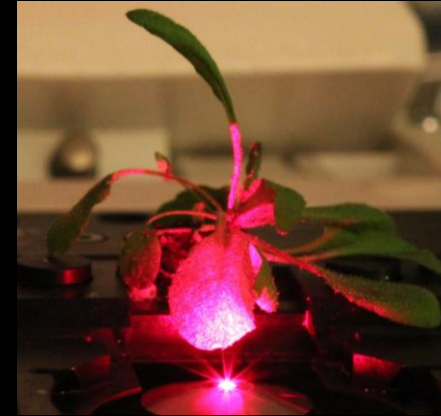
Li *et al.* *RSC Chemical Science* 2017  
Zou *et al.* *ACS Biochemistry*. 2018

## DEEP-BRAIN MICROSCOPY



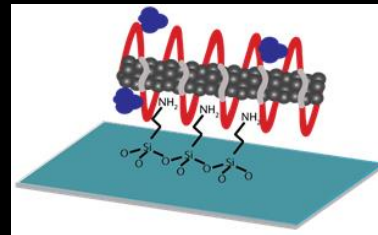
O'Donnell *et al.* *Adv. Funct. Mat.* 2017

## PLANT & PLASTID TRANSFORMATION



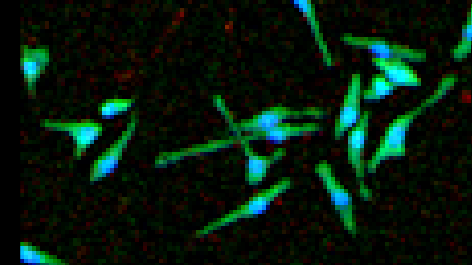
Demirer *et al.* *Nature Nanotechnology*. 2019  
Zhang *et al.* *PNAS* 2019  
Demirer *et al.* *Nature Protocols* 2019

## NANOSENSORS



Luo *et al.* *ACS Sensors*. 2017  
O'Donnell *et al.* *ACS Biochemistry*. 2018  
Chio *et al.* *Nano Letters* 2019

## NANO-BIO INTERACTIONS



Beyene *et al.* *Nano Letters* 2018  
Saleh *et al.* *NanoImpact*. 2017



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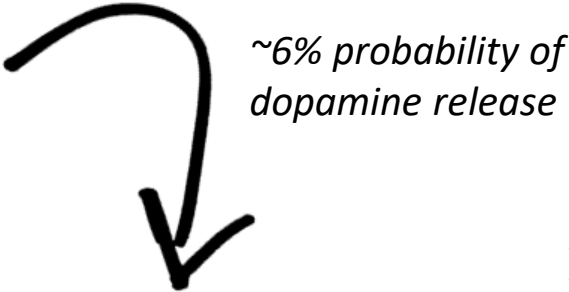
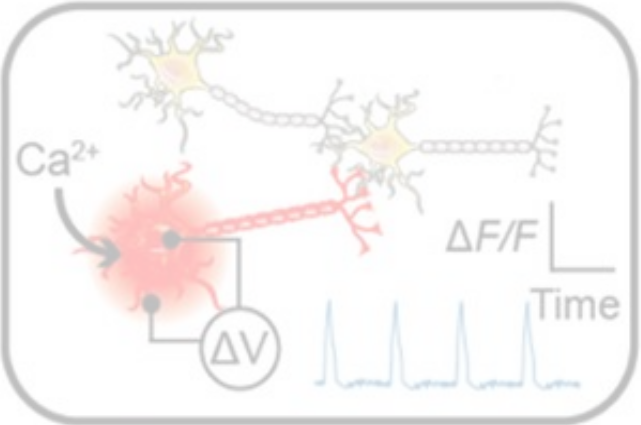
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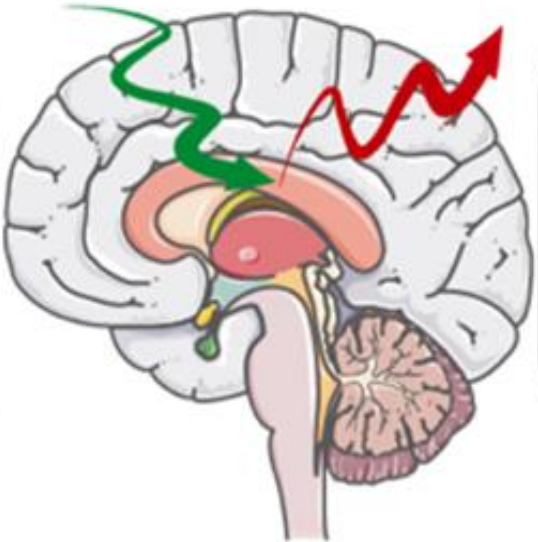
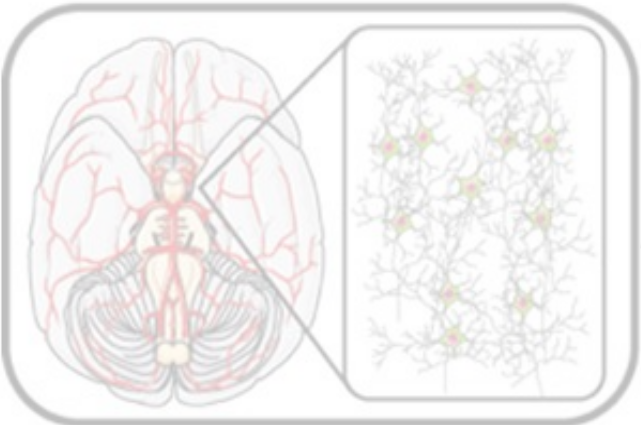
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# The Brain Structure-Function Relationship

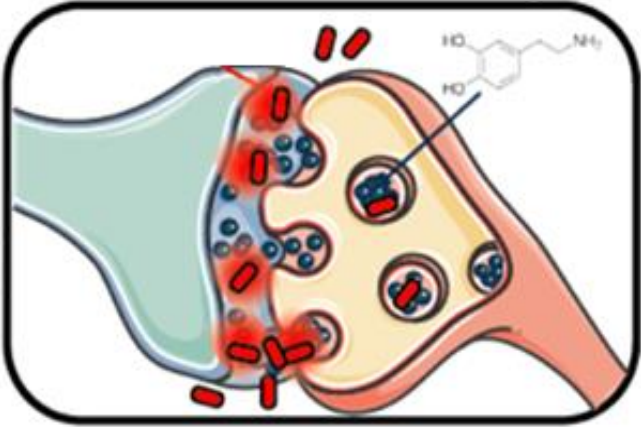
## Electrical Activity



## Structure & Connectivity



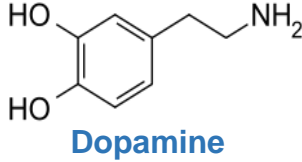
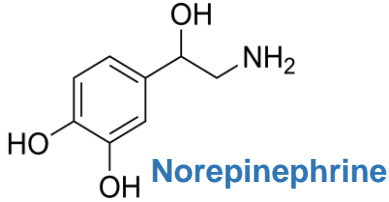
## Chemical Activity



- Blockers  
*Antipsychotics*
- Stimulants/supplements  
*Parkinson's, Huntington's*
- Re-uptake blockers  
*Antidepressants*

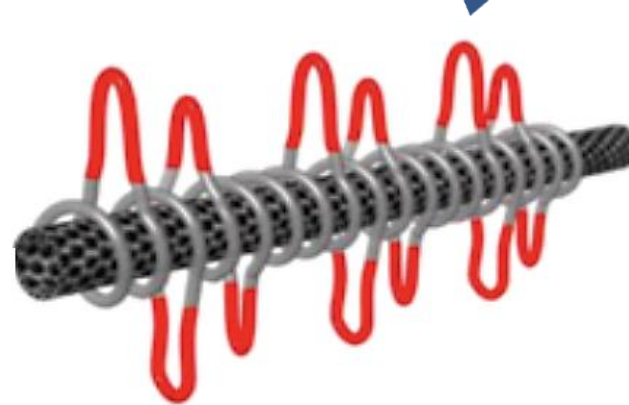
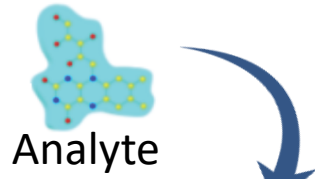
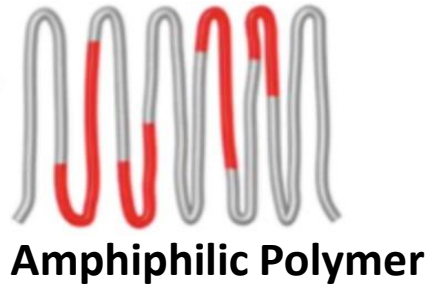
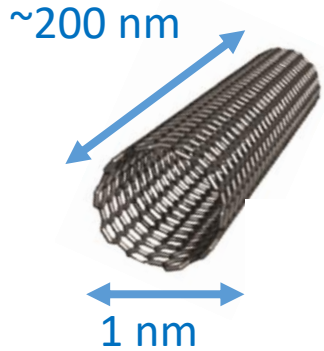
## Modulatory Neurotransmitters

"Missing dimension" in neurobiology

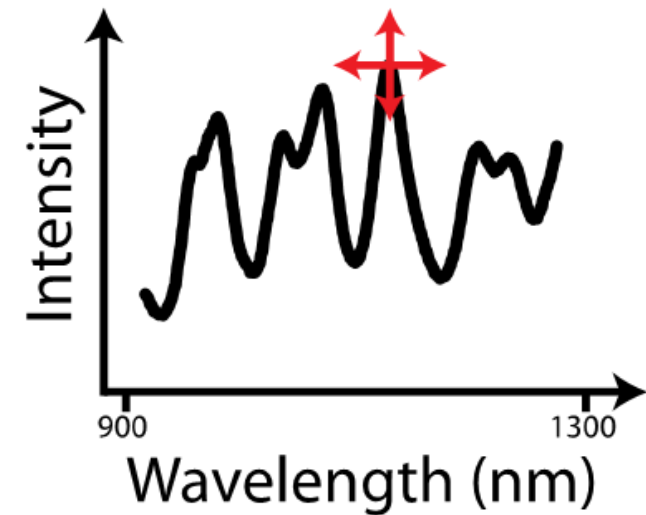
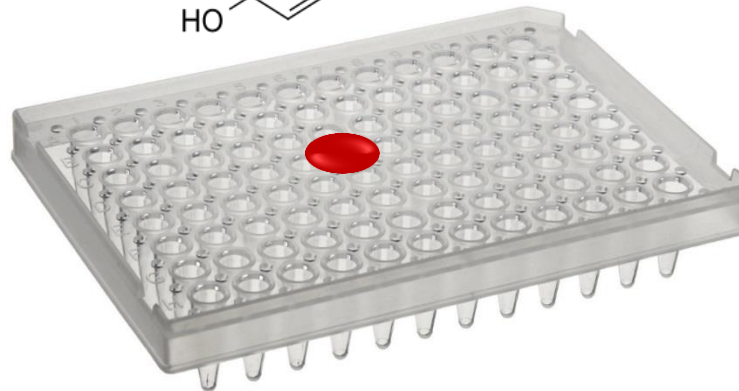
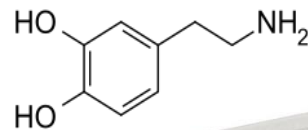
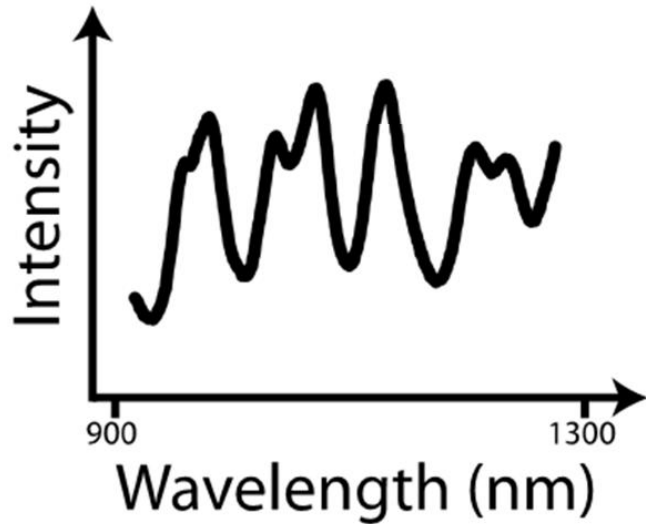
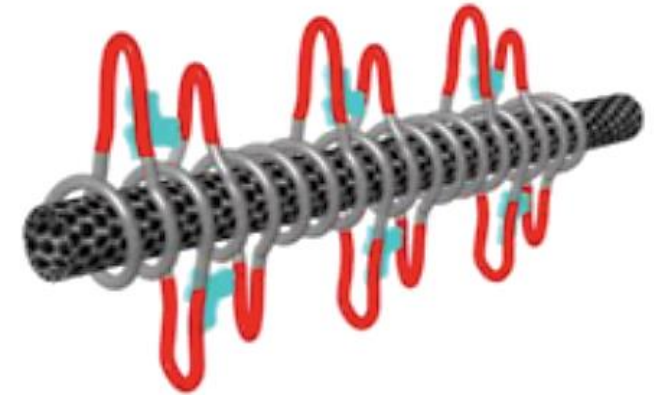


# Creating Molecular Recognition Sites for Neurotransmitter Dopamine

Signal Transducer

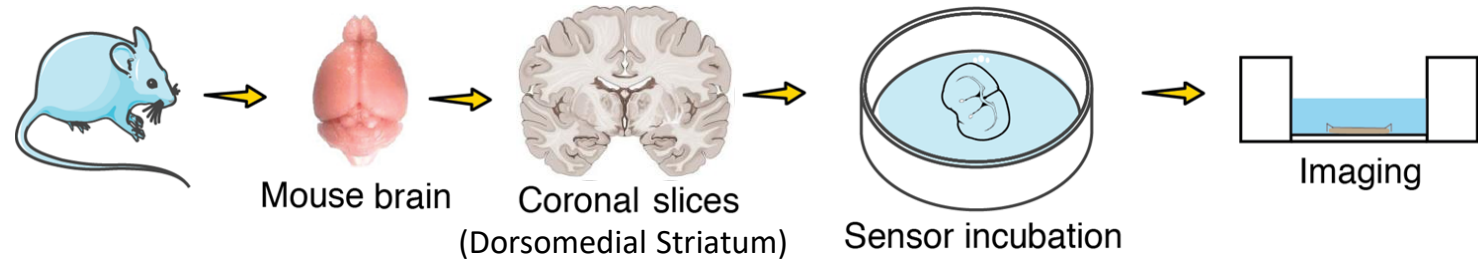


Analyte Produces Selective Change in I or  $\lambda$



# Dopamine Imaging Validation – Electrically-Stimulated Dopamine Release

With Linda Wilbrecht, UC Berkeley Psychology



$\Delta F/F$  quantification of stimulated dopamine release – single pulse electrical stimulation

