Bio-Derived Tubules for RF Applications

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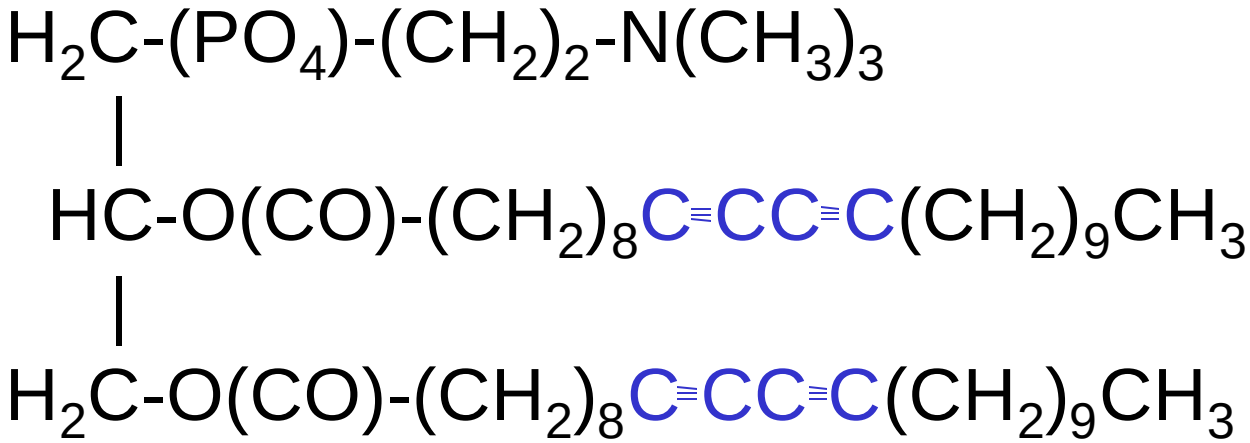
Lipid Morphologies

Lipid Vesicles

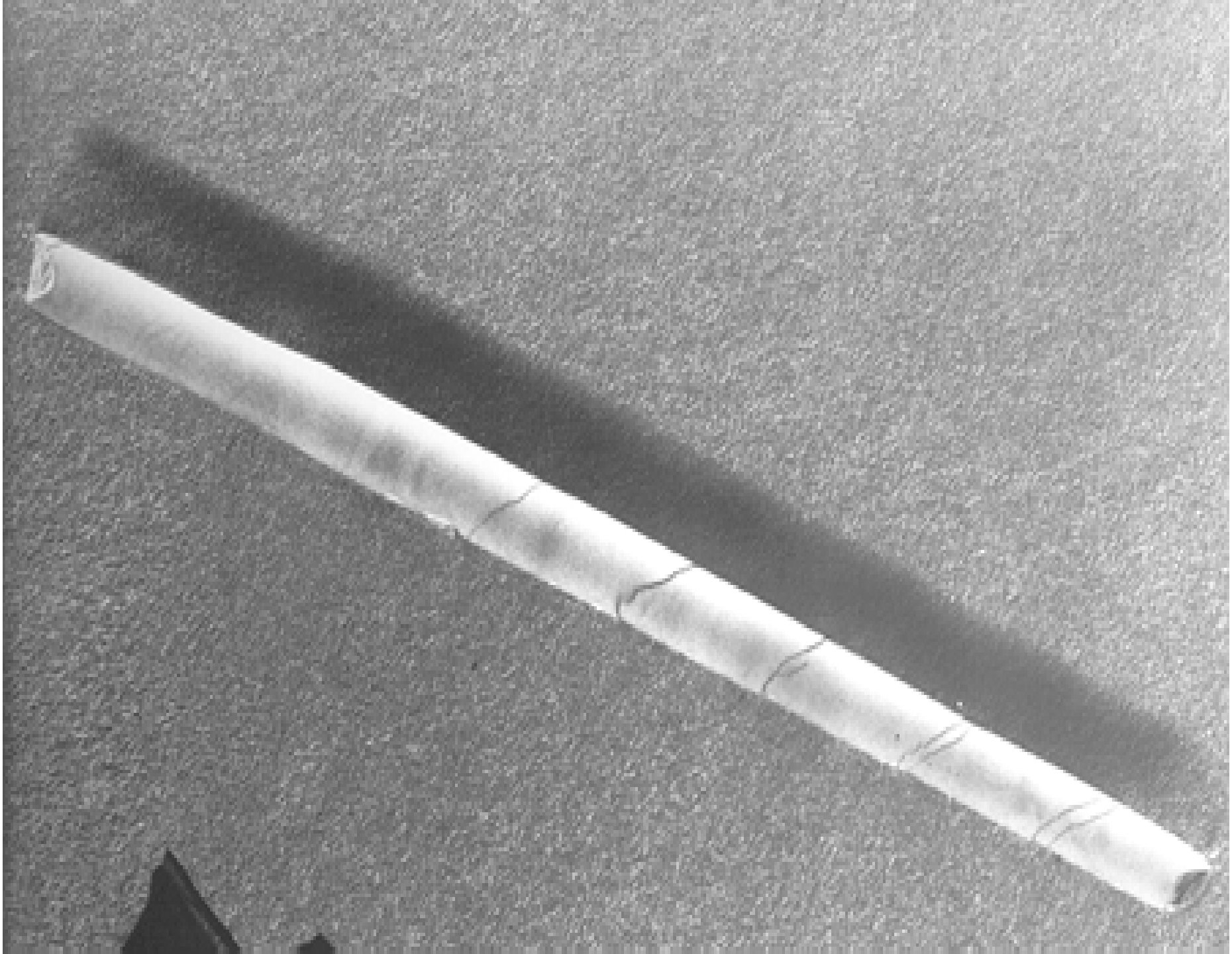
Tubule-forming Lipids



OR

DCm,nPC

Tubules

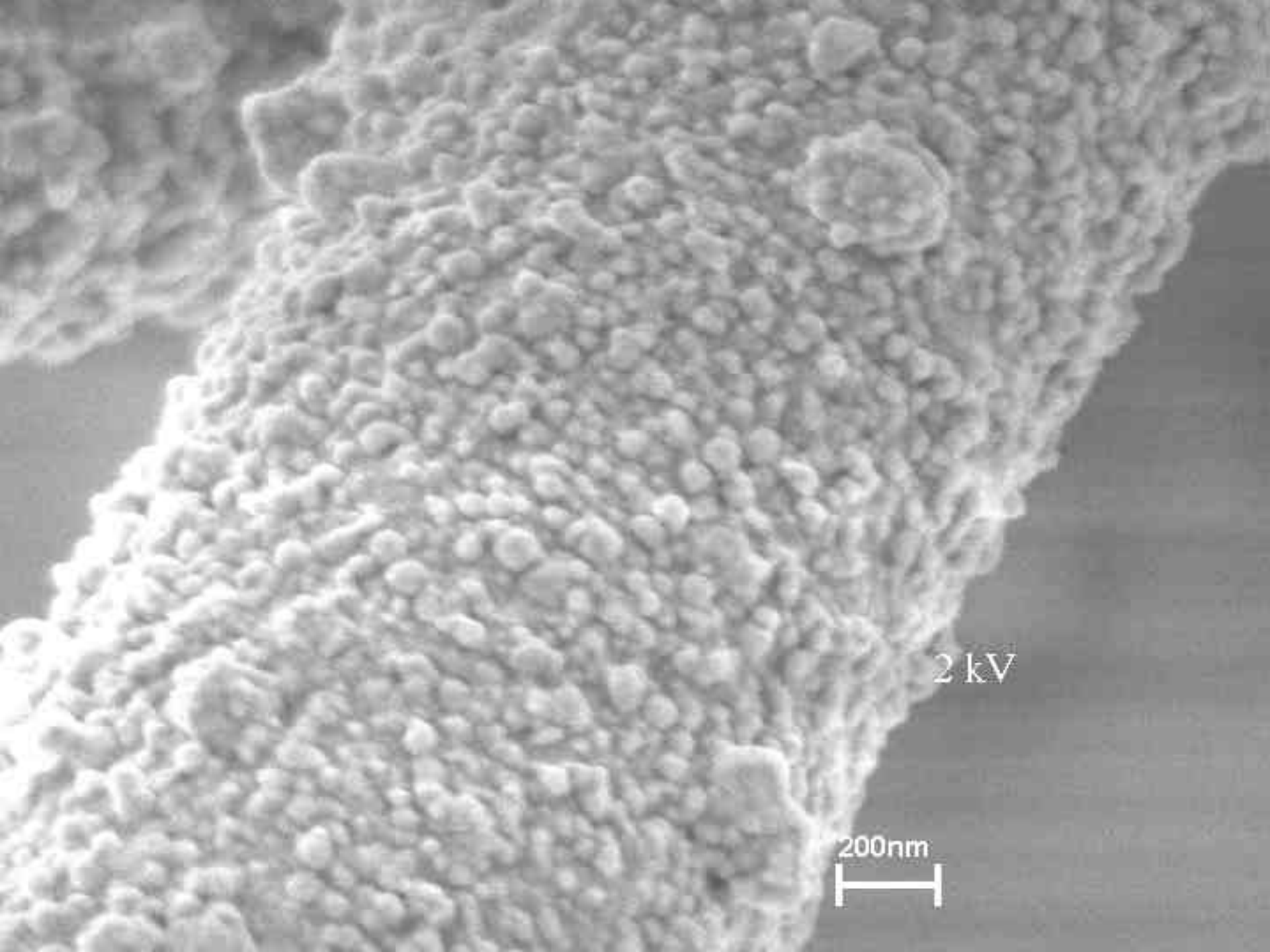


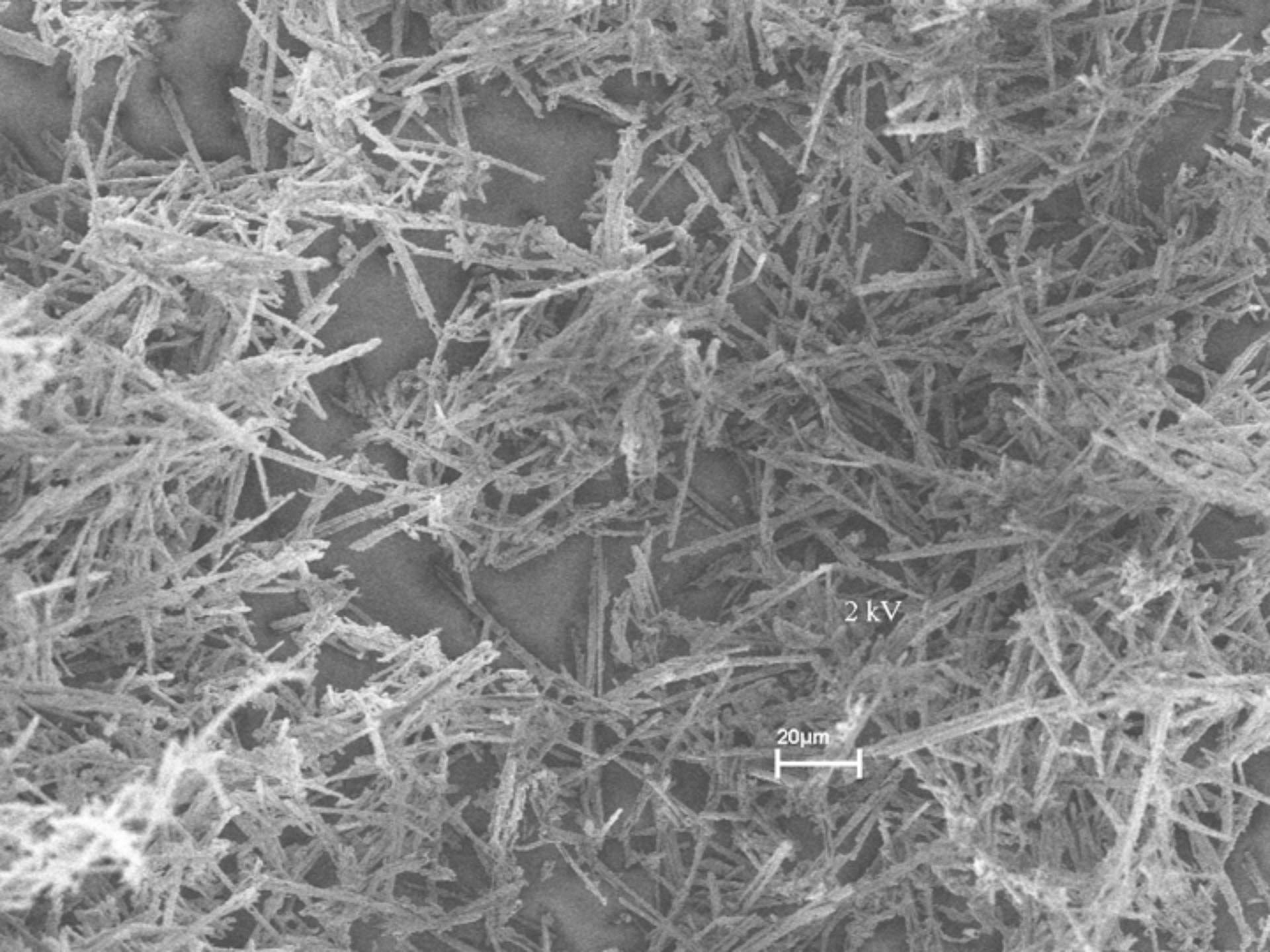
Electroless metallization

1) Attach Pd catalyst to tubules

2) Add metal ions and reductant

Catalyzed Tubule


2 kV
200nm

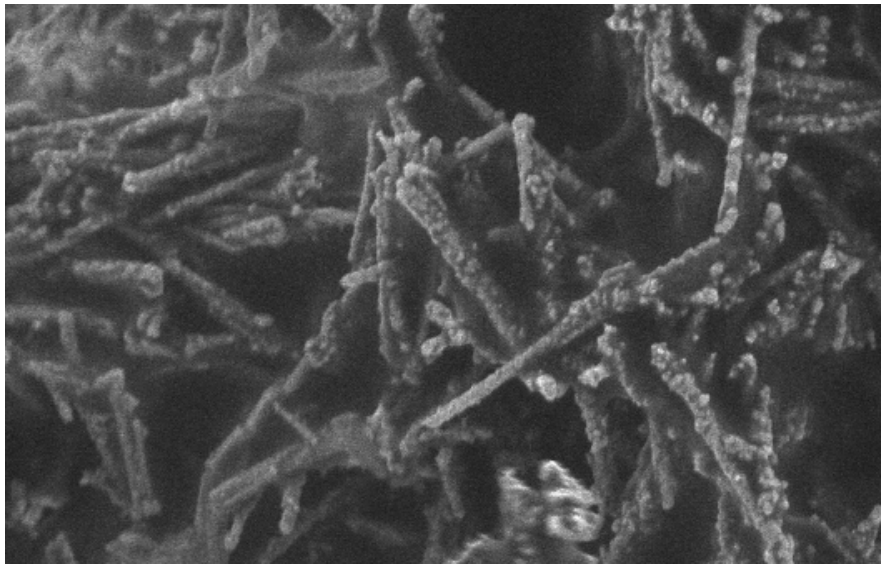

2 kV
20μm

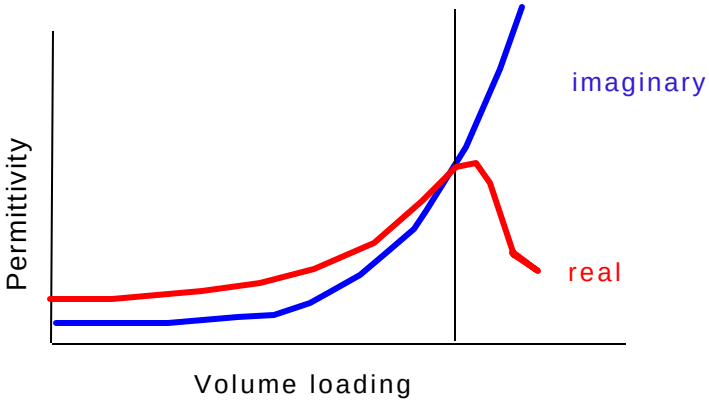
135A DIGITAL MULTIMETER
.0073
200
V
kΩ
DCA
ACA
Ω
50mA
COM
V-Ω
10A
COM

Artificial Dielectric Panels

Random dispersion of microscopic metal rods in polymer

Lossy at low loadings ÞÞ Lightweight composites

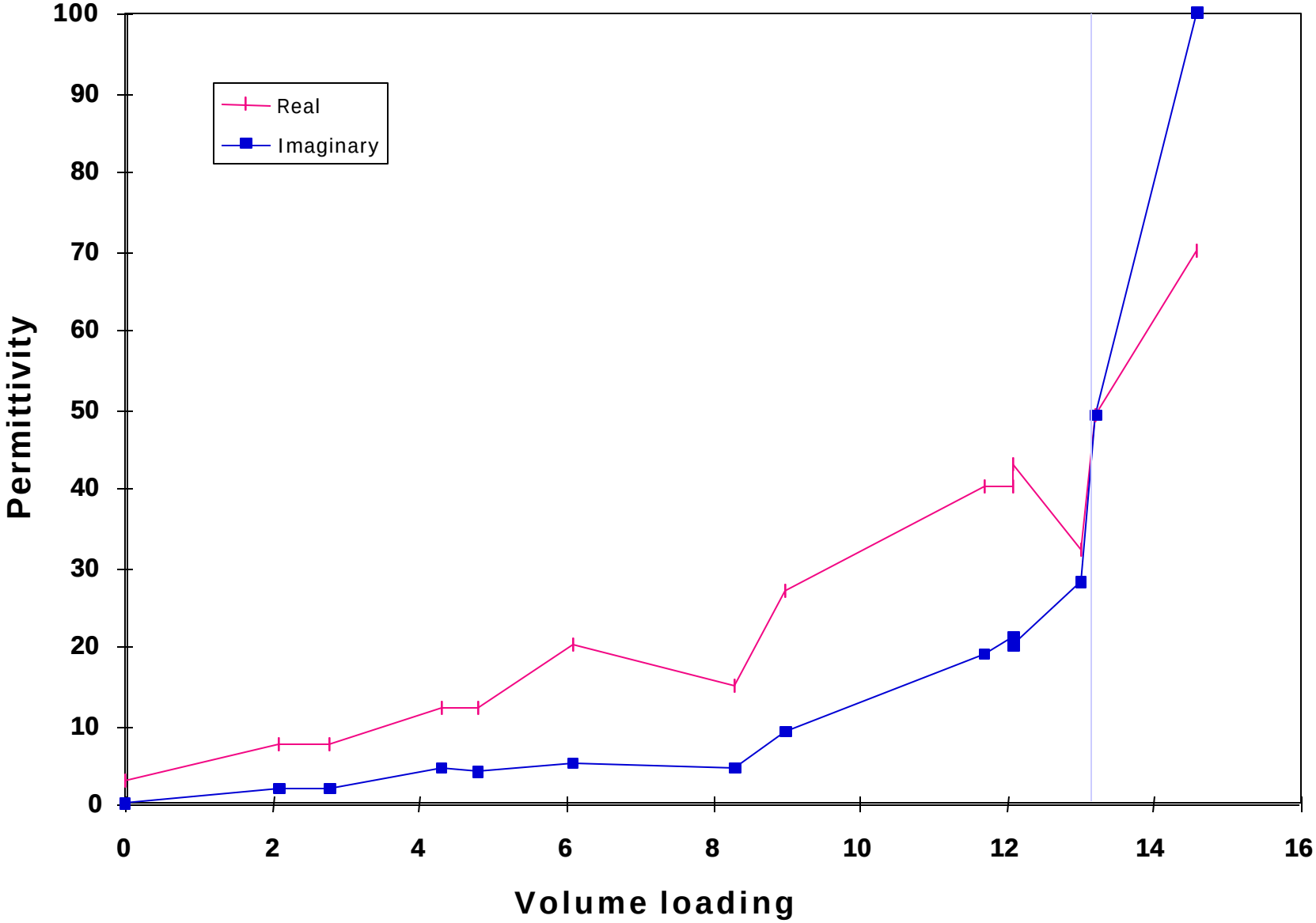




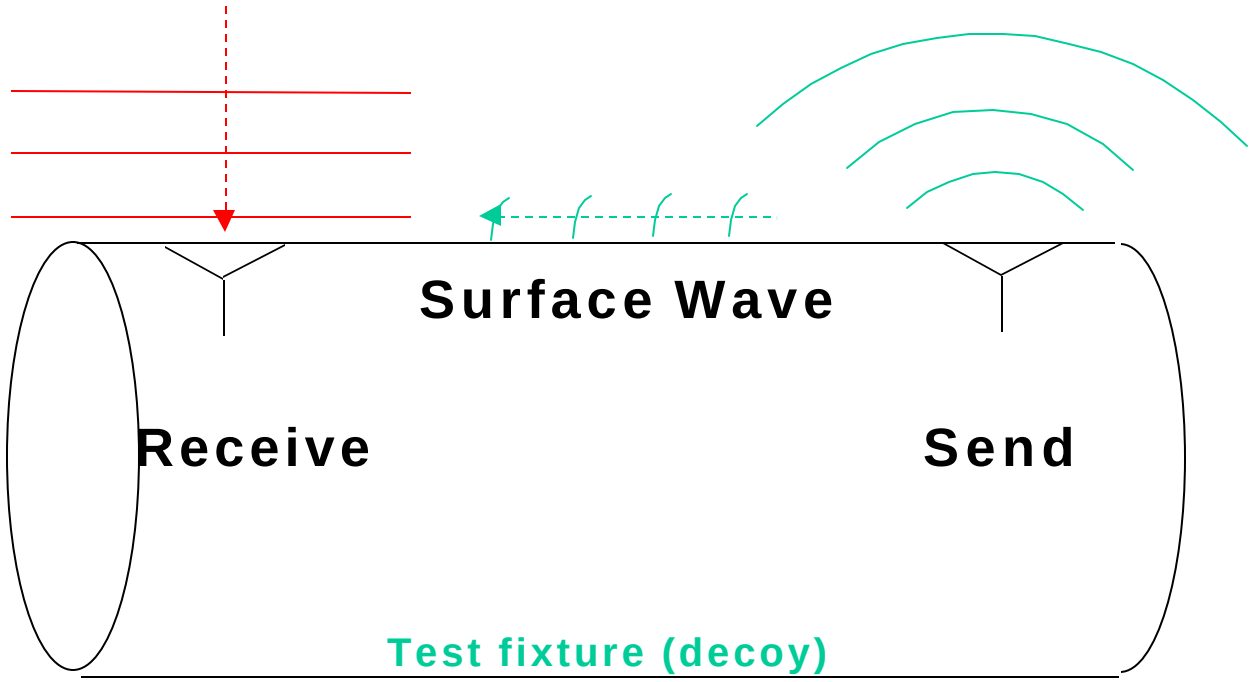
Bioderived microtubules: small size leads to broad bandwidth

Permittivity nonlinear with loading density

Composite Permittivity vs. Tubule Loading Density



Antenna Coupling on Decoy Surface



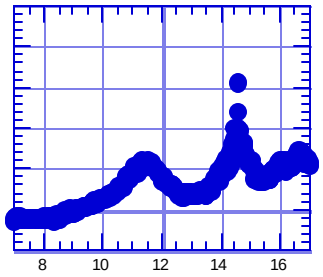
Decoy performance limited by feedback

Antenna Isolation:

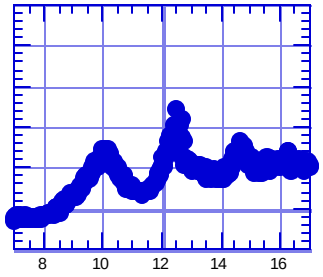
Attenuation vs. Frequency for different volume % loadings of tubules

Attenuation bandwidth increases with loading

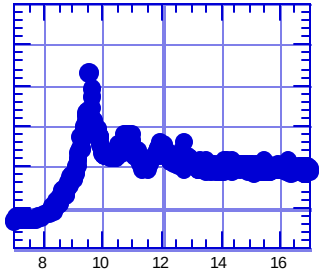
Dielectric panel weighs 60% less than comparable MAGRAM sheet



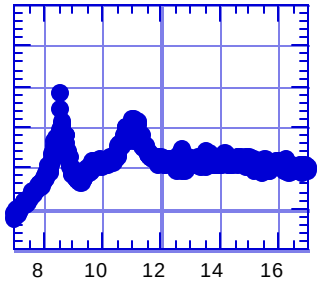
1 vol %



3 vol %



4 vol %



7 vol %