Multi-emissive Boron PLA Nanoparticles for Vascular Optical Hypoxia Imaging

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Project Summary

- Boron biomaterials synthesis
- Nanoparticle fabrication & characterization
- Biological testing
Boron Biomaterials

Fluorescence (F)
\[ \tau = 1.5 \text{ ns} \]
\[ \Phi_F = 0.89 \]

Phosphorescence (P)
\[ \tau_0 = 0.17 \text{ s} \]
BNPs & Biological Testing

BNPs: TEM

F

P

CHO Cells

HeLa Cells

Ex Vivo Gracilis Muscle (F)

In Vivo Cremaster Venules (F)

In Vivo Hypoxic Venules (F+P)

2008 Seed Project Results

February 9, 2010
Tumor Hypoxia Imaging

F/P Ratiometric Images (blue = hypoxic tumor region)

Brightfield Image

Carbogen (95 O₂)

Air (21% O₂)

Nitrogen (0 % O₂)
PEGylated BNPs for IV Injection

2008 Seed Project Results

February 9, 2010
Outcomes & Future Plans

• Boron PLA (+ PEG) materials were synthesized
• BNPs were fabricated by nanoprecipitation
• BNPs allow for vascular imaging
  – Microvessels (F = fluorescence)
  – Vascular damage/ischemia (P = phosphorescence)
  – Tumor hypoxia imaging (F/P ratiometric methods)
  – Hypoxia imaging, other (tissue engineering, wound healing, etc)