

# SELF-POWERED METAMATERIAL IMPLANTS

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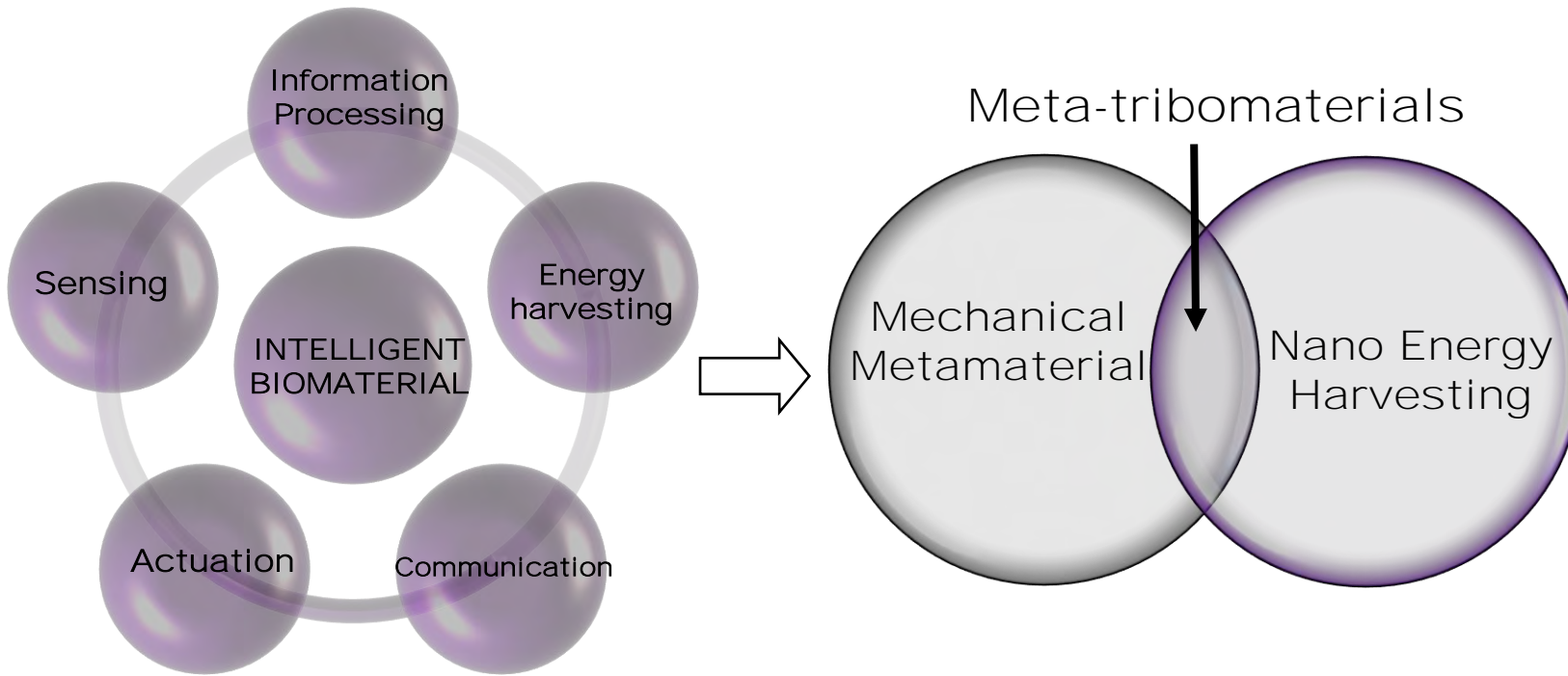
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**OMTEC**  
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# Self-powered Metamaterial Implants

## INTELLIGENT BIOMATERIAL



**Meta-tribomaterials: Architected biomaterials with active sensing, energy harvesting and communication capabilities**

Alavi, Barri, 2021, U.S. Patent Application No. 17/695,305.



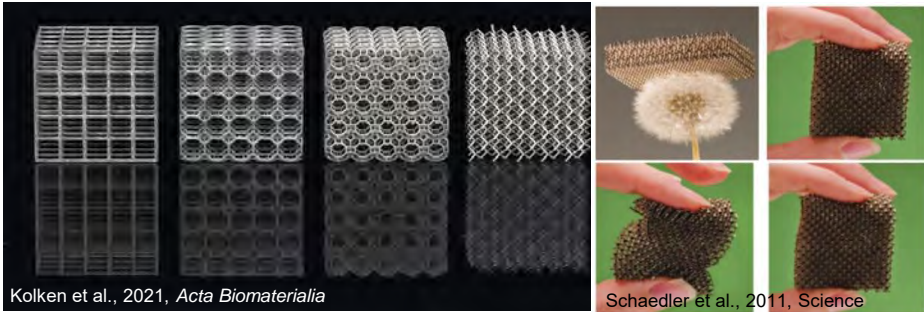
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# Self-powered Metamaterial Implants

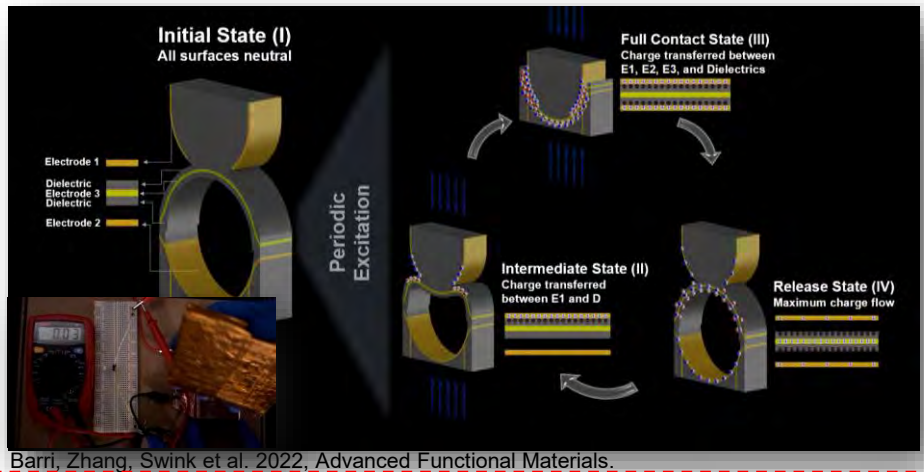
Meta-tribomaterials integrate:

## Mechanical Metamaterials (MMs)

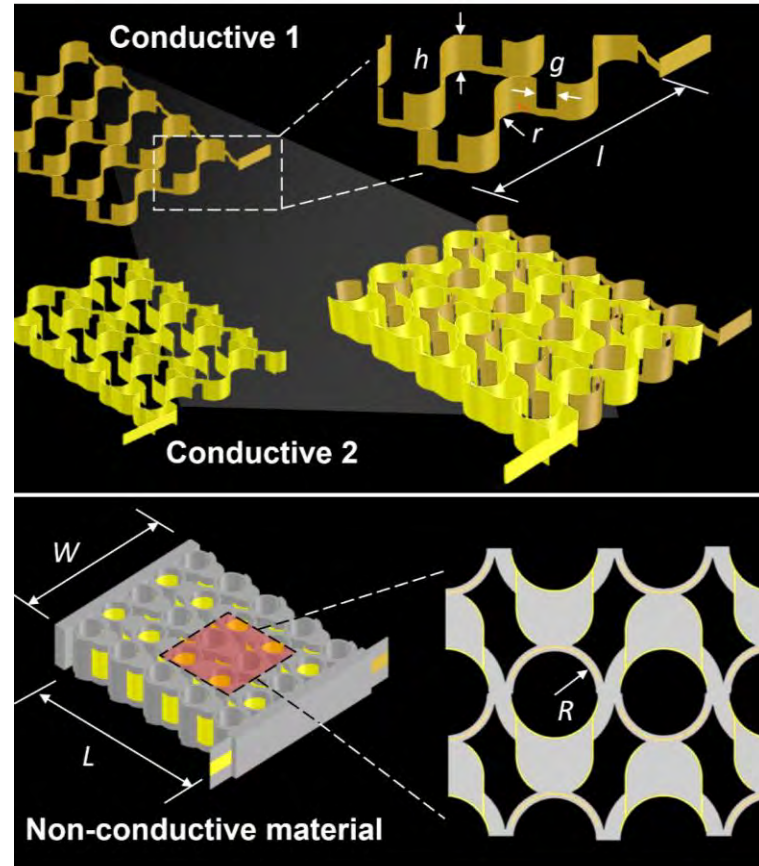


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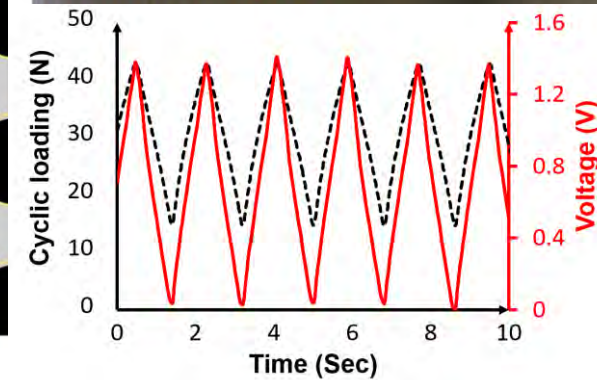
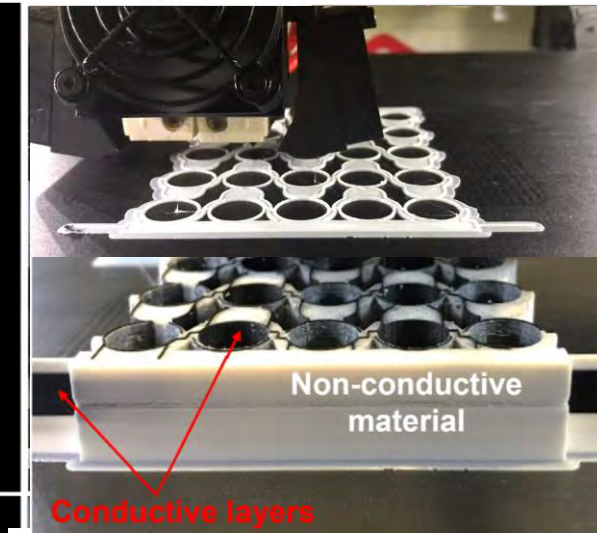
## Triboelectric Energy Harvesting



Meta-tribomaterials



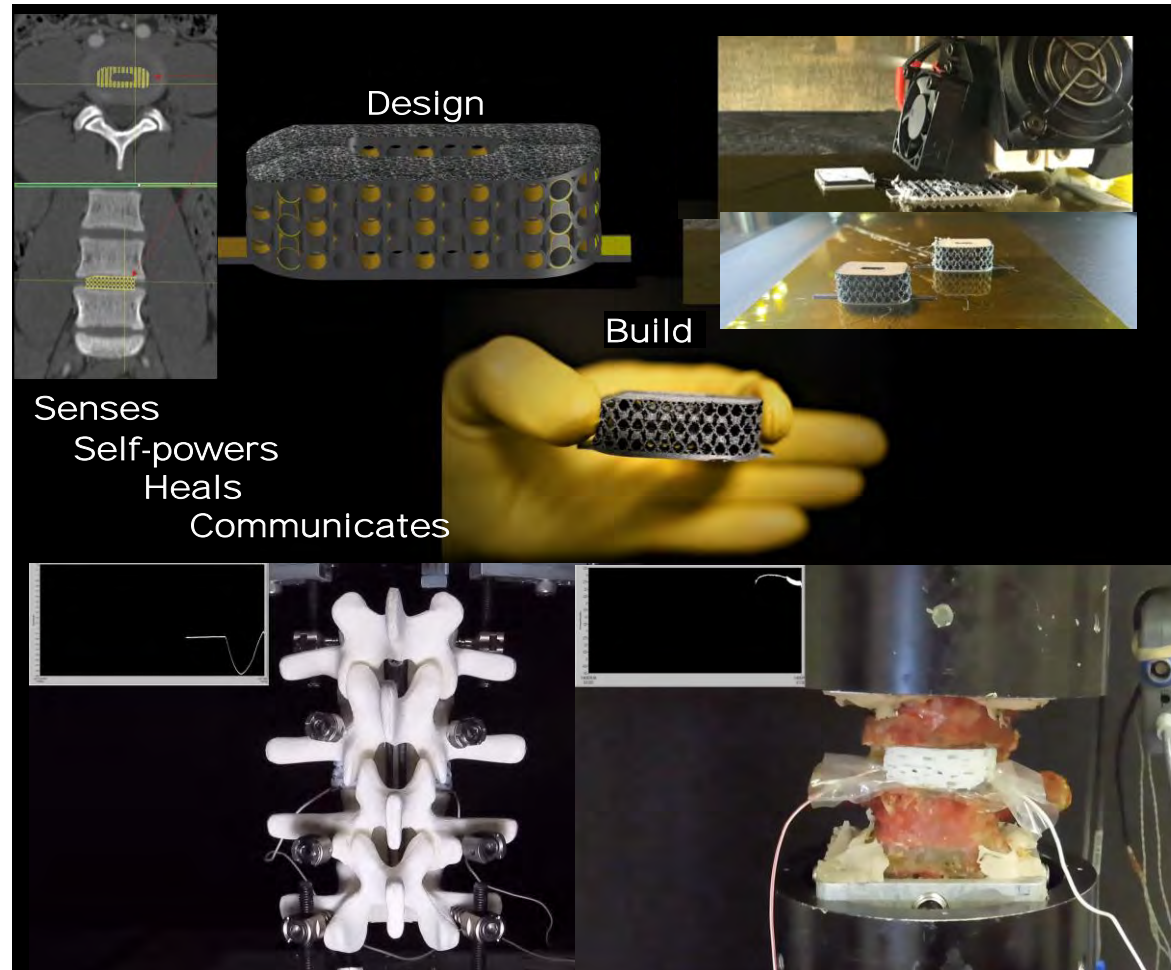
Barri, Zhang, Jun, Wang, Alavi, 2021, *Nano Energy*.  
Alavi, Barri, 2021, U.S. Patent Application No. 17/695,305.



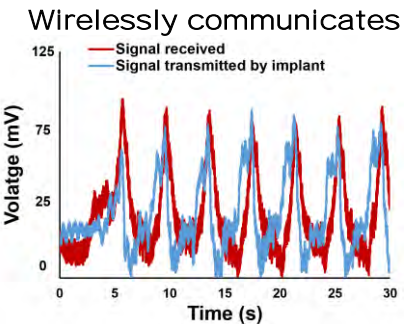
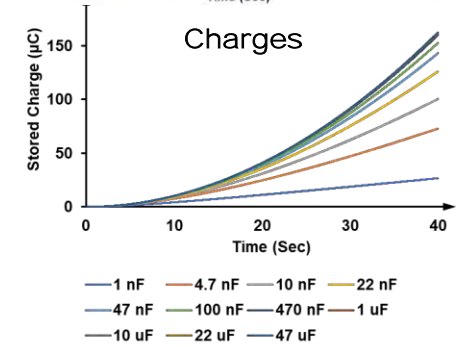
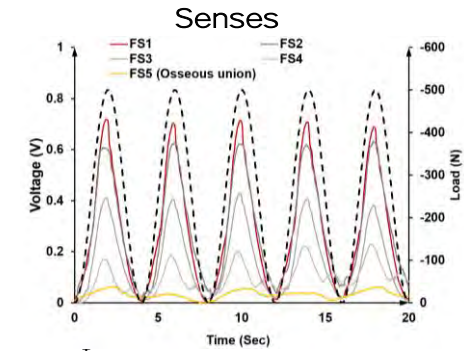


# NOVUOSIS Metamaterial Interbody Devices

- Patient-specific
  - Based on the patient's bone density, size, and spine curvature
- Self-powered
  - No batteries, no chemical risk, no limited life span
- Real-time monitoring
  - Monitoring healing process in real-time
- Accelerating the healing progress
  - The built-in nanogenerator electrically stimulates the bone healing
- Easy to fabricate
  - 3D printable



Barri, Zhang, Jun, Wang, Alavi, 2021, Nano Energy.  
Alavi, Barri, 2021, U.S. Patent Application No. 17/695,305.





Thank You

