Weill Cornell Medicine Graduate School of Medical Sciences



Ideal Polymer Concentrations

Reducing Image Brightness in Flexible RF Coils

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Significance

- MRIs used for medical imaging
- Alternative to CT scans- no exposure to radiation
- Radiofrequency coils are one of many integral parts of MRI





Motivation Common RF receive coils

- Rigi and inflexible
- Far from the body surface
- Reduced available SNR
- ~1mm isotropic resolution

Photo credit: https://us.medical.canon/products/magneticresonance/technology/integrated-calls/

Desired coil characteristics

- Form-fitting design
- Flexibility & stretchability
- Higher SNR
- ~0.5mm isotropic resolution

Proto credit: https://www.gehealthcare.com/prot imaxirg/air-technology/air-technology-colls magnetic-resonance-

Radiofrequency Coils

- Benefits of a flexible RF coil
 - Greater comfort for patients
 - Bringing coil closer to skin





Liquid Metal Alloy + Ecoflex

- Gallium-Indium alloy
 - Low melting point
 - Low toxicity
 - o Oxide skin
- Ecoflex
 - o Stretchable
 - \circ Flexible
 - Retains shape/tear resistant





Knee Image







- Lessen MRI presence of Ecoflex polymer
- Testing different polymers to reduce its appearance



Methods

Die B Tear Strength

Tensile Strength

100% Modulus



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22 pli

120 psi

8 psi

38 pli

200 psi

10 psi

50 pli

315 psi

12 psi

MRI Image

- MRI image obtained through T1 and T2 times
- T1 inversion recovery
- T2 mapping



Methods





T1 Time









			TE
S	=	a	T2

where T2 = b

Ecoflex 10 = 179 Ecoflex 30 = 204.2 Ecoflex 50 = 170.7

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Preliminary Findings

- Ecoflex 00-50
 - least visible of all polymers
 - Lowest T1 and T2 of three polymers



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