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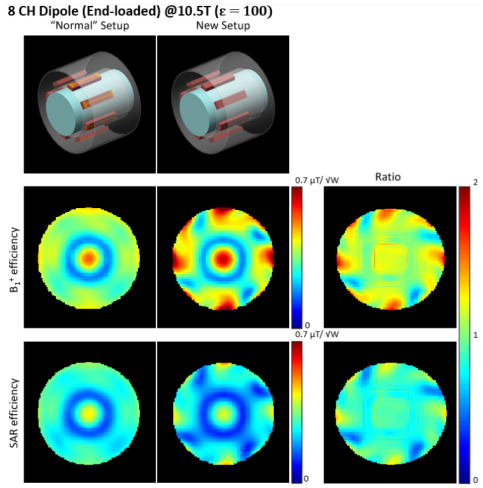
MRI RF coil for improved field efficiency and image quality

A novel RF coil design with high dielectric constant materials to improve B1+ efficiency in MRI systems.



IP Status: Issued US Patent 11,543,475

Applications

- Magnetic resonance imaging hardware

Key Benefits & Differentiators

- 2x improvement in B1+ transmission efficiency
- significantly shorten scan time or use less power for peak flip angle
- No additional hardware/software modification needed
- Simple setup modification with HDC materials that are currently used
- Scalable implementation

Overview

In MRI systems, placement of high dielectric constant (HDC) pads between the subject and dipole antennas of radio frequency (RF) coils has been shown to significantly improve the image signal-to-noise ratio (SNR) and B1 field uniformity, while reducing the overall required input RF power. In addition, HDC pads improve transmission efficiency without requiring changes to the software or hardware alterations in standard clinical MRI systems.

Researchers at the University of Minnesota have designed **a novel RF coil apparatus with antenna-HDC material that is shown to substantially improve B1+ efficiency** compared to currently available designs with HDC material or with inductively shortened dipole materials. This improvement is achieved by a simple counterintuitive modification in the antenna-HDC

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Category
Engineering & Physical Sciences/Design Specifications
Engineering & Physical Sciences/Instrumentation, Sensors & Controls
Engineering & Physical Sciences/MRI & Spectroscopy
Life Sciences/Diagnostics & Imaging
Life Sciences/Medical Devices
Life Sciences/MRI & Spectroscopy

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material setup, and does not require any additional hardware or software modifications. Using an 8 channel array at 10.5T, researchers have demonstrated that this new design improves the B1+ efficiency by 2-fold and SAR (specific absorption rate) efficiency comparable to a typical RF coil setup with HDC pads. Furthermore, computer simulation and experimental evidence shows that the radiated field to the RF shields is also reduced using this new design.

Phase of Development

Working prototype. Simulation and experimental characterization in a 10.5T MRI system.

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

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Researchers

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