

SPINNING SPHERES FOR MAGNETIC RESONANCE

[Albert, Brice, Barnes, Alexander](#)

[Weilbaecher, Craig](#)

T-017912

Background: A commonly used approach for the analysis of the molecular structure, content, and purity of solid and liquid samples is magic angle spinning nuclear magnetic resonance (MAS NMR). This technique provides greater resolution to better identify and analyze chemical spectra compared to solid state NMR without MAS. Currently, MAS NMR involves spinning a cylindrical container to mitigate interactions between nuclei in the sample (Figure A); however, due to its cylindrical shape, the axes on both ends are very short, generating several disadvantages for the system:

1. It confers an inherently unstable spinning to the system
2. It limits the maximum spinning frequency
3. It necessitates the use of two gas streams for function

Therefore, there is a need for a better spinning system for MAS-NMR.



Technology Description: Scientists at Washington University in St. Louis have developed a spherical rotor system that circumvents the issues leading to the limited spinning frequency and instability of the cylinder model (Figure B). The spherical shape distributes the rotor mass further from the spinning axis than a cylinder does, enabling a very large angular momentum. Only a single gas stream is required for spinning about a single axis, allowing for greatly improved and simplified spinning.

Key Advantages:

- Increases spinning stability
- Maximizes spinning frequency and angular momentum
- Only one gas stream needed