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Imaging Water in Clay to Aid with Short Signal Lifetime Samples in the Human Body

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Magnetic resonance imaging (MRI) has several uses outside of the clinic, such as imaging water in soil and minerals. These often necessitate extremely short imaging times due to the properties of the material. Enabling the imaging and measurement of these short-scan-time samples can provide solutions to imaging short signal lifetime tissues in the human body, such as proteins.

Water in clay has been shown to require extremely short scan times when using a high field strength MRI system: the signal lifetime at 3T is less than a millisecond. The signal lifetime is longer at lower fields, and so we imaged water penetration in a clay sample at only 73mT. We used a specific pulse sequence, the X-Centric sequence, which allows for extremely short scan times by separating each acquisition in two. We captured real-time images of the water and measured a 4.4ms signal lifetime at 73mT using this sequence.