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Uniaxial Strain Tuning of Altermagnets

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Altermagnetism is a newly recognized form of magnetic order that combines useful features of both ferromagnets and antiferromagnets. Like antiferromagnets, altermagnets can have almost no net magnetization, so they produce little stray magnetic field. Like ferromagnets, however, they can strongly affect the motion of electrons, making them promising for future spintronic devices. A major challenge is that these effects are often hidden when a material contains multiple magnetic domains, whose signals average together. Here we show that this problem can be overcome in the hexagonal altermagnet α-MnTe by applying uniaxial strain. Strain along a Mn–Mn bond direction selects a single magnetic domain, allowing us to determine the underlying magnetic configuration and reveal a much sharper anomalous Hall effect, an electrical signal produced by the material's electronic structure. Even more strikingly, strain can reverse the sign of this Hall signal near room temperature, while leaving the magnetic transition temperature essentially unchanged. This shows that strain not only selects the magnetic domain, but also changes the electronic Berry curvature responsible for the Hall response. Our results demonstrate a practical way to control altermagnets using strain, an approach that can be readily incorporated into future devices.