

MS15-2-14 Molten-salt growth of ruthenate quantum materials
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Abstract

Quantum materials are highly topical because their macroscopic properties cannot be understood simply by semi-classical descriptions of their constituent particles [1]. An essential part of understanding those properties is careful crystal growth and structural characterisation [2]. We are currently exploring the influence of different crystal growth techniques on the quantum states of materials with highly sensitive structure-property relationships.

Of particular interest are strontium ruthenates such as $\text{Sr}_3\text{Ru}_2\text{O}_7$. Careful crystal growth and structure characterisation was essential in determining the intrinsic properties of this material due to elements of structural disorder, such as stacking faults [3], and structural distortions [4]. One route to high quality crystals that has not yet been explored for $\text{Sr}_3\text{Ru}_2\text{O}_7$ is alkali metal molten-salt growth, which we are doing for the first time.

We are also exploring other materials in the Sr–Ru–O phase diagram and have succeeded in growing high quality single crystals of $\text{Sr}_4\text{Ru}_2\text{O}_9$. We are using these to determine its physical properties in a more informative manner than has previously been undertaken [5, 6], and thus are advancing the understanding of an exciting quantum material.

References

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Single crystal grown of $\text{Sr}_4\text{Ru}_2\text{O}_9$

