Understanding the Growth of Ruddlesden-Popper Oxides

Scientific Achievement
Scientists studied the synthesis window of $\text{Sr}_{n+1}\text{Ir}_n\text{O}_{3n+1}$, Ruddlesden-Popper (RP) type oxides, and provided a more accessible avenue to stabilize metastable materials.

Significance and Impact
RP oxides provide a unique way to study exotic physics such as emergent phenomena; these findings offer insights for studying and engineering materials with specific electronic and magnetic properties.

Research Details
- Grew high quality films of $\text{Sr}_2\text{IrO}_4$, $\text{Sr}_3\text{Ir}_2\text{O}_7$, and $\text{SrIrO}_3$ by varying the oxygen pressure.
- Demonstrated growth window expansion by introducing argon into the growth chamber.
- Structural analysis of the RP oxides, by combining magnetic x-ray scattering at the NSLS-II ISR beamline with physical property measurements, provided the ability to draw a growth phase diagram.

The image shows the schematic structure of $\text{Sr}_2\text{IrO}_4$, $\text{Sr}_3\text{Ir}_2\text{O}_7$, and $\text{SrIrO}_3$. These materials, especially $\text{Sr}_3\text{Ir}_2\text{O}_7$, are a unique playground to study exotic physics such as spin-flop transitions.


Work was performed in part at Brookhaven National Laboratory.