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Correlated phases in nickelates

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Nickel oxides have long been of interest due to their strong electron interactions, dating back to the question of why NiO is an insulator, not a metal. In perovskite and infinite-layer structures (as well as related derivatives), the Ni oxidation state can range from 3+ to 1+ via structural and chemical doping - although all are commonly referred to as nickelates. This family of compounds exhibit a wide range of correlated phenomena, such as metal-insulator transitions, magnetism, density-wave/stripe instabilities, and recently superconductivity. We will present recent progress on using topochemical processes and strain to synthesize and probe some of these phase transitions and ground states.