Oxynitrides are attractive due to a combination of visible-light absorption, photocatalytic activity, and high dielectric permittivity. Their synthesis typically requires high-temperature NH₃ treatment of oxides, but the highly reducing conditions and the low mobility of N³⁻ greatly constraint the composition, structure, and hence properties of the resulting oxynitrides.

A MRSEC team has demonstrated a *topochemical route* to making oxynitrides at less than 500°C using a perovskite oxyhydride as a host, obtaining a room-temperature ferroelectric BaTiO₃−ₓNₓ/3. Anion exchange is accompanied by a metal-to-insulator cross-over via mixed O–H–N intermediates. This “labile hydride” strategy can now be applied to other oxynitrides and perhaps other mixed anionic compounds. BaTiO₃−ₓN₂ₓ/3 also has potential applications in next-generation electronics.

Japan Science and Technology Agency, DMR-1420620 and DMR-1210588, Japan Society for the Promotion of Science for Research Abroad (No. 25-185), Spring-8 Synchrotron Source. Takeshi Yajima,¹ Fumitaka Takeiri,¹ Kohei Aidzu,¹ Hiroyuki Akamatsu,² Koji Fujita,¹ Masatoshi Ohkura,¹ Wataru Yoshimune,¹ Shiming Lei,² Venkatraman Gopalan,² Katsuhisa Tanaka,¹ C. M. Brown,³ Mark A. Green,⁴ Takafumi Yamamoto,¹ Yoji Kobayashi¹ and Hiroshi Kageyama¹; ¹Kyoto Univ., ²Penn State, ³NIST, ⁴Univ. of Kent. Nature Chemistry, 7, 1017–1023 (2015).