

# Concurrency control of the magnetic and ferroelectric transition in tetragonal-like BiFeO<sub>3</sub>

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The highly-elongated phase of BiFeO<sub>3</sub> has attracted particular attention because of the concomitant multiferroic transition near room temperature [1]. The antiferromagnetic transition temperature of the highly-elongated phase is largely suppressed to ~370 K and moreover the ferroelectric order undergoes a first order transition to another ferroelectric state simultaneously at the magnetic transition temperature indicating strong spin-lattice coupling. To nail the concomitance down, we have examined chemical substitution effects on the multiferroic transition. Here we will introduce our tentative phase diagram investigated by x-ray reciprocal space maps, capacitance measurements, scanning soft x-ray absorption spectroscopy, and Landau phenomenological theory. These findings will provide new insight into magnetoelectric coupling [2].

[1] K. T. Ko *et al.*, *Nature Communications* 2, 567 (2011)

[2] B.-K. Jang *et al.*, Electric-field-induced spin disorder to order transition (in preparation)