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Strain coupling between nitrogen vacancy centers and the mechanical motion of a diamond optomechanical crystal resonator J. V. CADY, K. W. LEE, P. OVARTCHAIYAPONG, A. C. BLESZYNSKI JAYICH, University of California Santa Barbara — Several experiments have recently demonstrated coupling between nitrogen vacancy (NV) centers in diamond and mechanical resonators via crystal strain[1]. In the strong coupling regime, such devices could realize applications critical to emerging quantum technologies, including phonon-mediated spin-spin interactions and mechanical cooling with the NV center[1]. An outstanding challenge for these devices is generating higher strain coupling in high frequency devices while maintaining the excellent coherence properties of the NV center and high mechanical quality factors. As a step toward these objectives, we demonstrate single-crystal diamond optomechanical crystal resonators with embedded NV centers. These devices host highly-confined GHz-scale mechanical modes that are isolated from mechanical clamping losses and generate strain profiles that allow for large strain coupling to NV centers far from noise-inducing surfaces. 1. D. Lee, *et al.*, arXiv:1609.00418, (2016)

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