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Field emission from atomically thin edges of reduced graphene oxide HISATO YAMAGUCHI, Rutgers Univeristy, KATSUHISA MURAKAMI, Osaka University, GOKI EDA, Imperial College London, TAKESHI FUJITA, Tohoku University, JULIEN BOISSE, Rutgers University, PENGFEI GUAN, Tohoku University, FUJIO WAKAYA, Osaka University, KYEONGJAE CHO, YVES CHABAL, University of Texas at Dallas, MINGWEI CHEN, Tohoku University, MIKIO TAKAI, Osaka University, MANISH CHHOWALLA, Rutgers University — Point sources show the best electron emission properties due to local field enhancement at the tip. A drawback of tip emitters is that they must be positioned sufficiently apart to achieve field enhancement, limiting the number of emission sites and therefore the overall current. In contrast, we report ultra-low threshold voltage emission of multiple electron beams from atomically thin edges of individual reduced graphene oxide (rGO) sheets. The emission sites observed by field emission (FEM) and field ion (FIM) microscopies are atomically spaced along the edge. FEM measurements indicate evidence for interference, suggesting that the emitted electron beams are coherent. Based on our spectroscopy, high-resolution transmission electron microscopy and theory results, field emission is attributed to the aggregation of oxygen groups in the form of cyclic edge ethers. Such closely spaced electron beams from rGO offer prospects for novel applications and understanding the physics of linear electron sources.

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