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Synthetic Cu_2O crystals with various morphologies prepared by thermal oxidation[1] SHAHIN MANI, JOON JANG, JOHN KETTERSON, Department of Physics & Astronomy, Northwestern University, KETTERSONS'S TEAM — Cuprous oxide (Cu_2O) is an extensively studied semiconductor with a rich history in exciton related physics; it has also been a popular solar cell material. A major impediment to workers studying this material has been the difficulty in fabricating high quality crystals. Achieving a low concentration of impurities and defects is an essential requirement in obtaining increased exciton lifetimes. We have prepared high-quality crystals of Cu_2O by an improved thermal oxidation technique. Using this strategy we have formed crystals in various geometries including; i) platelets, ii) cylindrical wires, iii) hollow cylindrical structures, and iv) spheroids. The formation of hollow cylindrical structures or tubules of Cu_2O by oxidizing copper wires in air is especially surprising. We will discuss photoluminescence experiments involving one- and two-photon excitation and optical absorption measurements at 2 K from the synthetic samples, which in some respects out perform natural (geological) crystals. The more unconventional structures of Cu_2O may be utilized to confine excitonic matter or serve as high density exciton-polariton cavities

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