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Wigner crystallization in $\text{Na}_3\text{Cu}_2\text{O}_4$ and $\text{Na}_8\text{Cu}_5\text{O}_{10}$ chain compounds. P. HORSCH, Max-Planck-Institute for Solid State Research, D-70569 Stuttgart, Germany, M. SOFIN, M. MAYR, M. JANSEN — We report the synthesis of novel doped edge-sharing chain compounds $\text{Na}_3\text{Cu}_2\text{O}_4$ and $\text{Na}_8\text{Cu}_5\text{O}_{10}$, which form insulating states with commensurate charge order [1]. We identify these systems as one-dimensional Wigner lattices, where the charge order is determined by the long-range Coulomb interaction and the number of holes in the d-shell of Cu. Our interpretation is supported by X-ray structure data as well as by an analysis of magnetic susceptibility and specific heat data. Remarkably, due to large second neighbor Cu-Cu hopping, these systems allow for an unambiguous distinction between the classical Wigner lattice and the $4k_F$ charge-density wave of quantum mechanical origin. Finally, we briefly discuss the domain-wall type charge excitations and the theoretical expectation for the optical conductivity of 1D Wigner lattices [2]. [1] P. Horsch, M. Sofin, M. Mayr, and M. Jansen, Phys. Rev. Lett. 94, 076403 (2005). [2] M. Mayr and P. Horsch, (unpublished).

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