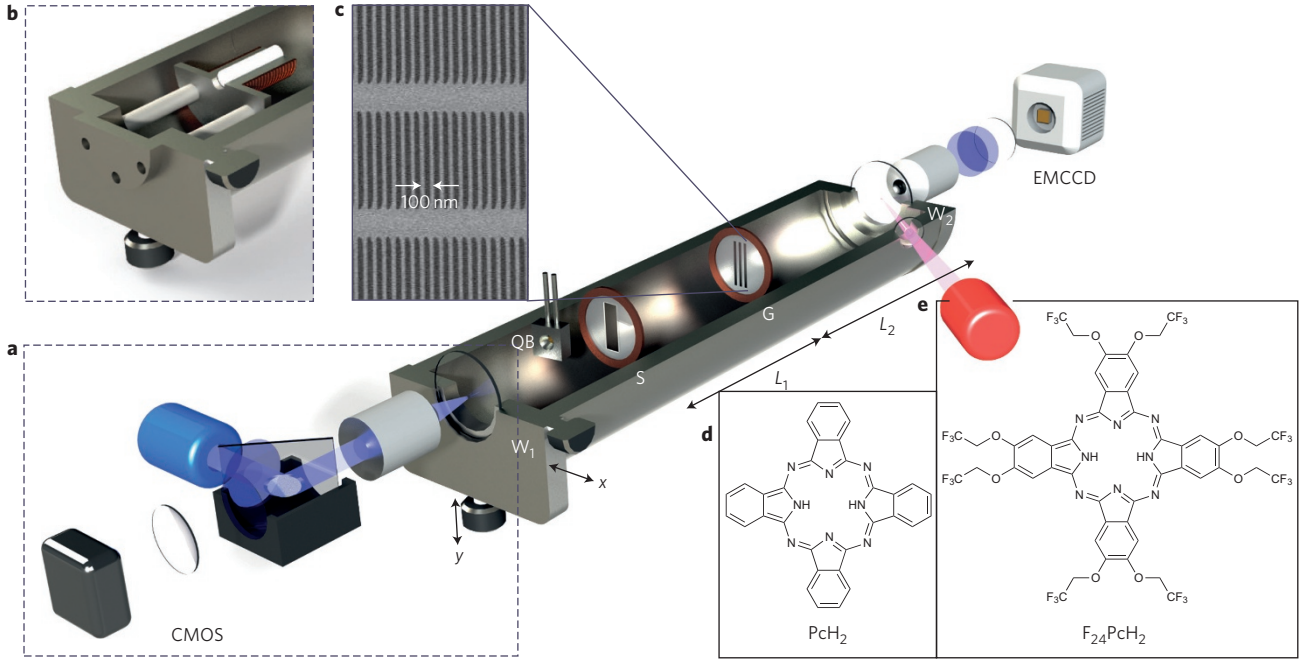

Figure 1 | Set-up for laser-evaporation, diffraction and nano-imaging of complex molecules. a, Thermolabile molecules are ejected by laser micro-evaporation. A blue diode laser (445 nm, 50 mW) is focused onto window W_1 to evaporate the molecules coated on its inner surface. A CMOS camera and a quartz balance (QB) monitor the evaporation area and the molecular flux. **b**, Stable molecules can be evaporated in a Knudsen cell. The collimation slit S defines the beam coherence. The molecular beam divergence is further narrowed by the width of the diffraction grating G. **c**, Electron micrograph showing that the grating is nanomachined into a 10-nm-thin SiN_x membrane with a period of $d = 100$ nm. The vacuum system is evacuated to 1×10^{-8} mbar. Molecules on quartz window W_2 are excited by a red diode laser (661 nm). High-resolution optics collects, filters and images the light onto an EMCCD camera. **d**,**e**, The molecules for this study: phthalocyanine PcH_2 ($C_{32}H_{18}N_8$, mass $m = 514$ AMU, number of atoms $N = 58$, **d**) and its derivative $F_{24}PcH_2$ ($C_{48}H_{26}F_{24}N_8O_8$, $m = 1{,}298$ AMU, $N = 114$, **e**). The mass, atomic number and internal complexity of $F_{24}PcH_2$ are approximately twice those of PcH_2.