Viruses are pathogens causing disease, but they can also be modified to serve as vectors in gene therapy or nanocontainers for technological purposes. They are ubiquitous and play a significant role in regulating the ocean carbon cycle. They cause natural selection of hosts and facilitate horizontal gene transfer. Consequently, viruses are main actors in the development of life on Earth. This proposal addresses the fundamental questions of how complex virus particles assemble, and how they disassemble upon interaction with their host cell to successfully start a new infectious cycle. We focus on viruses of interest in biomedicine, virus evolution, and marine ecology. We will use advanced imaging techniques (cryo-electron microscopy, cryo-electron tomography, and cryo-correlative light and electron microscopy) to solve structures of purified virus particles, and to image their dismantling in the host cell. In an interdisciplinary approach, we will test the virucidal properties of new materials of applicability in water decontamination.