O-20.5 Short talk

Structures, Energetics, and Dynamics of Active Tubulin Self-Organization

Uri Raviv [1]

[1] Institute of Chemistry, The Hebrew University of Jerusalem, Jerusalem, Israel

Microtubules (MTs) are one of the major components of the cytoskeleton. They are involved in many key functions of eukaryotic cells, including cell division, intracellular transport, cell motility, and cell shape. MTs are hollow tubules made of parallel filaments, formed by active (non-equilibrium) self-organization of tubulin dimers. The GTPase activity of tubulin facilitates the dynamic self-organization of tubulin. Tubulin self-assembles with MT-associated proteins (MAPs) and other factors into different morphologies, including tubulin rings, MT bundles, and the spindle apparatus. Recent studies reveal the intimate link between tubulin -biochemistry, -structure, -interactions, -dynamics, -stability, -assembly, -disassembly, and -mechanical properties. The presentation will focus on recent time-resolved solution X-ray scattering analysis of tubulin self-organization below and above the critical conditions for MT assembly. We shall discuss some of the challenging multiscale unsolved problems requiring the integration of different experimental and theoretical methods. Microtubule formation is an important target for drugs to treat conditions like gout and a wide range of cancers. Understanding the polymerization mechanism could help design future drugs and develop active biomaterials that promote the remodeling or regeneration of tissue after disease or injury.