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Dynamics of Multi-Component Model Membranes Studied via Light and X-Ray Scattering KEVIN JOHNSON, MAIKEL RHEINSTÄDTER, University of Missouri — We study the dynamics of multicomponent biological model membranes (phospholipid, ethanol, cholesterol systems) via X-ray and light scattering to probe the dynamics of such membranes in solid supported and freestanding configurations. Collective molecular motions may play a significant role in different biological functions such as transmembrane transport and pore opening processes. Our main research objective is to quantify collective molecular motions in membranes and establish relationships to key physiological and biological functions of the bilayers. The phase diagram of this system with varying cholesterol and ethanol concentrations at set temperatures is determined using X-ray diffraction techniques and the mesoscopic membrane dynamics is then measured using time correlation light scattering techniques. The results can be compared to molecular dynamics simulations in a coarse grained membrane model. The dynamics shows propagating and relaxating processes, which allow to determine, e.g. the elasticity parameters of the bilayers. By understanding the mesoscopic properties of membranes with selected composition, membranes with specific properties can be designed.

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