Special Issue

Thermodynamics and Self-Organization in Living Systems

Message from the Guest Editor

This Special Issue emphasizes the crucial role that thermodynamics can play in understanding the thermodynamic coupling between chemical reactions and the transport of substances in bioenergetics that may lead to self-organization. Thermodynamics has the advantages of identifying possible pathways, providing a measure of the efficiency of energy conversion, and of the thermodynamic coupling between various processes without requiring a detailed knowledge of the underlying mechanisms for such coupling. Through thermodynamic coupling, a flow can occur without or against its conjugate force if the cross coefficients do not vanish. As living systems grow and develop, supply of material, energy, and information (in addition to inherited information) are necessary for establishing organized structures for the ability of reproduction and surviving in changing conditions. Maintaining a state of organization requires a number of coupled metabolic reactions and transport processes with mechanisms controlling the rate in space and time of the living systems.

Guest Editor

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