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Thesis Title	<i>Synthesis of biocompatible water-soluble polyvinylpyrrolidone / polyvinyl alcohol composites with dispersed nano-graphene platelets and dielectric study at pressures from 1 to 2000 bar and temperatures from 20 to 120°C</i>
Supervisor	A. Papathanassiou, Assistant Professor
Summary	<p>In the present work, we developed composite materials of polymeric matrix and conductive dispersed inclusions, and their response at temperatures from 20 to 120°C and hydrostatic pressures from 1 to 2000 bar. Water soluble polyvinyl pyrrolidone (PVP) and polyvinyl alcohol (PVA) blend at ratio of 50%-50% w / w. The dispersed phase consisted of nano-graphene platelets (NGP) of various concentrations. Such composites are widely used in the polymer development industry. They are biocompatible, non-toxic, environmentally friendly, low cost polymers. Additionally, graphene is a carbon allotrope of interesting electronic properties. The resulting composite materials combine the above properties of the original ingredients. The selected combination of temperature and pressure provides the possibility of monitoring the phase transition of the matrix from semicrystalline to rubber. The electrical charge flow in this system is studied by a combined change of the above mentioned parameters using broadband dielectric spectroscopy and the mechanisms are understood at a microscopic level by the determination of (dynamic) activation volumes and activation energies. Moreover, the possibility of detecting changes in charge carrier mobility is observed. There is a tendency of convergence of isobars into two groups.</p>
Key words	nanocomposites, polyvinyl pyrrolidone, polyvinyl alcohol, nanographene platelets, dielectric spectroscopy
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