第185回エンレイソウの会
日本物理学会北海道支部講演会

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講演者:　Prof.　Natasha Kirova
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題　目:『Electronic ferroelectricity in carbon-based systems:
from reality of organic conductors to promises of polymers』

要　旨:Ferroelectricity is a demanded effect in fundamental and applied solid state physics. Till now, the ferroelectrics were available mostly in electronically and optically inert, usually inorganic, materials. The electronic ferroelectricity was discovered in conducting organic stacks of $(TMTTF)_2X$ at their Mott insulator phase, and now it is studied in layered BEDT-compounds with the charge ordering, and in complexes with neutral-ionic transitions; this research is very active in Japan.

In this talk we discuss the existing and the expected ferroelectricity in electronically and optically active carbon-based materials: organic crystals, conducting polymers and even graphene ribbons.

We indicate the type of conducting polymers – the substituted polyacetylene - where the ferroelectricity should be present. The theory predicted an existence of solitons with non-integer variable charges, both with and without spin, which are the walls separating domains with opposite electric polarisation. Their physics will serve to relate transient ferroelectric processes and the visible range optics.

We shall interpret the experimental data for $(TMTTF)_2X$ allowing to separate the critical relaxation within ferroelectric domains and the repolarization via sweeping of domain walls. We determine the critical slowing-down near the transition temperature, and the low frequency absorption coming from the creep of domain walls.

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