

## Requests for Collaboration

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<p><b>Research Interests</b></p> <ul style="list-style-type: none"><li>● Dynamical properties of nonlinear excitations (solitons, polarons and breathers) in conducting polymers and graphene nanoribbons</li><li>● Electron-correlation effects in organic conductors</li><li>● Metal-insulator transition in electron-lattice systems</li></ul>	
<p><b>Creative Achievements in The Application of New and Existing Science and Technology</b></p> <p>(1) Numerical simulations of armchair graphene nanoribbons have revealed that the dynamical properties of polarons, a collective excitation of the electronic charge coupled with the lattice vibrations, are strongly dependent on the ribbon width of the nanostructure.[1] Fractionally charged solitons under the external electric field have tuned out to have a maximum velocity above which a uniform translational motion of the soliton is not allowed, which provides a phenomenological understanding of the electronic transport properties of organic conductors and inorganic transition-metal trichalcogenides.[4]</p> <p>(2) Variational Monte Carlo study using the matrix-product states have confirmed that a single soliton is stable against the “binding” of two solitons, which suggests that the soliton is an elementary excitation in the organic conductors with strong electron-electron interactions.[2]</p> <p>(3) The triangular lattice has turned out to undergo an unprecedented Peierls transition, in which multi components of vibrational modes are condensed below the transition temperature.[5] Several different types of domain wall excitations in the square lattice system are investigated.[3]</p>	
<p><b>Technology (Product, Process, Device, Service etc.) That I Want to Request for Collaboration</b></p> <ul style="list-style-type: none"><li>● Theoretical condensed matter physics</li><li>● Computer simulation of strongly correlated electron systems (QMC, MPS, DMRG etc.)</li><li>● Nonlinear and nonequilibrium physics</li></ul>	
<p><b>A List of 5 Key Publications</b></p> <p>[1] Dynamics of charge carriers on hexagonal nanoribbons with vacancy defects, W. F. da Cunha, P. H. de Oliveira Neto, <u>A. Terai</u> and G. M. e Silva, <i>Phys. Rev. B</i>, <b>94</b>, 014301 (10 pages) (2016).</p> <p>[2] Fractionally charged solitons in "1100" charge order backgrounds, K. Hirokawa, <u>A. Terai</u>, Y. Ono, <i>J. Phys. Soc. Jpn.</i>, <b>85</b>, 034707 (7 pages) (2015).</p> <p>[3] Domain wall in multimode Peierls state, Y. Matsumoto, <u>A. Terai</u>, <i>J. Phys. Soc. Jpn.</i>, <b>83</b>, 114705 (9 pages) (2014).</p> <p>[4] Dynamics of fractionally charged phase soliton in one-dimensional quarter-filled electron-lattice system, K. Hirokawa, <u>A. Terai</u> and Y. Ono, <i>J. Phys. Soc. Jpn.</i>, <b>82</b>, 104708 (7 pages) (2013).</p> <p>[5] Multimode Peierls distortion in triangular lattice, K. Miyoshi, <u>A. Terai</u>, <i>Physica Status Solidi B</i>, <b>249</b>, 967-970 (2012).</p>	