



実験報告書様式(一般利用課題・成果公開利用)

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 	承認日 Date of Approval 2017/10/2 承認者 Approver Ryoichi Kajimoto 提出日 Date of Report 2017/10/2
課題番号 Project No. 2017A0097 実験課題名 Title of experiment Investigation of phonon lifetime in a prototypical CDW compound ZrTe3 実験責任者名 Name of principal investigator Yuan Li 所属 Affiliation Peking University	装置責任者 Name of Instrument scientist Kazuki Iida, Kazuya Kamazawa 装置名 Name of Instrument/(BL No.) BL-01 実施日 Date of Experiment May 8 th -May 18 th

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。(適宜、図表添付のこと)
 Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form. ZrTe3

2. 実験方法及び結果 (実験がうまくいかなかった場合、その理由を記述してください。) Experimental method and results. If you failed to conduct experiment as planned, please describe reasons. In this experiment, we systemically studied the lattice dynamics and electron-phonon coupling in prototypical CDW material ZrTe3, by systematically characterizing phonon dispersion in the 4D momentum-energy space. High-quality single crystals of ZrTe3 were grown by a chemical vapor transport method. A total mass of 4.5g crystals are co-aligned with a mosaic of 1.6° in the scattering plane (H, 0, L). Firstly, we performed the measurement at 4K utilizing the multiple-Ei method with incident energy of 27meV and 42meV to study the linewidth of the phonons that are most strongly coupled to conduction electrons in order to resolve the contrast between Raman and INS linewidths in our preliminary result. As is shown in Fig.1(a) and Fig.1(b) at 15meV there are at least 2 branches of phonons closed to each other. Similarly, there are also at least two neighboring phonons around 18meV at Brillion zoon center. This result is also consist with our first principle calculation result about the phonon energy at BZ center. Therefore, in our preliminary triple-axis neutron scattering result both of the neighboring phonons contribute to the phonon linewidth,
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2. 実験方法及び結果(つづき) Experimental method and results (continued)

however, in Raman scattering only one of them has Raman activity and hence can be studied individually. Our result explain the contrast between Raman and INS of measuring the phonon linewidths in this system.

We have measured the CDW diffraction peak below $T_{cdw}=63K$ and the Kohn anomaly above T_{cdw} . The measurements are preformed by using an incident energy of 8.5 meV. Fig.2 shows the CDW diffraction peak (2.07, 0, 1.33) in ac plane. Fig.3 shows the mapping of the acoustic phonon which exhibits Kohn anomaly. The data are obtained along the momentum cut throng Bragg peak (2, 0, -1) and CDW diffraction peak (1.93, 0, -1.33). This result will be published with our other neutron result together.

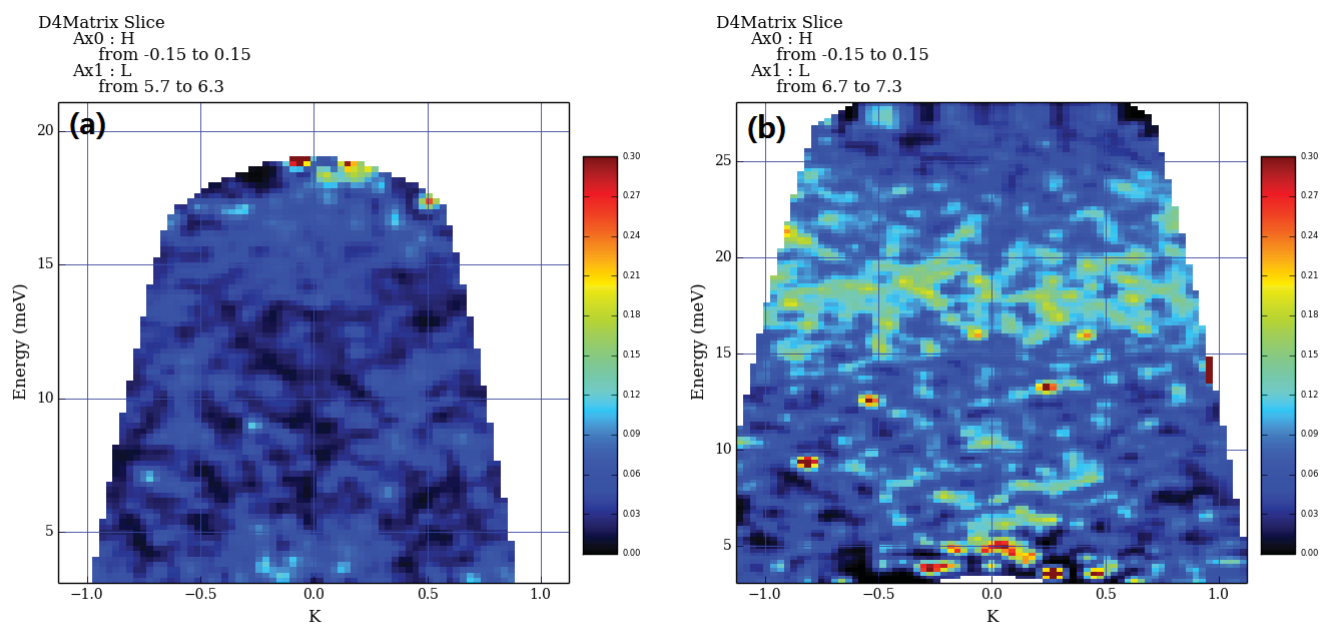


FIG. 1

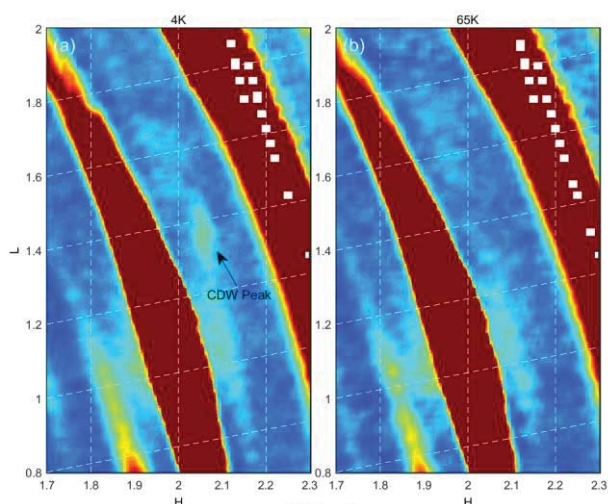


FIG. 2

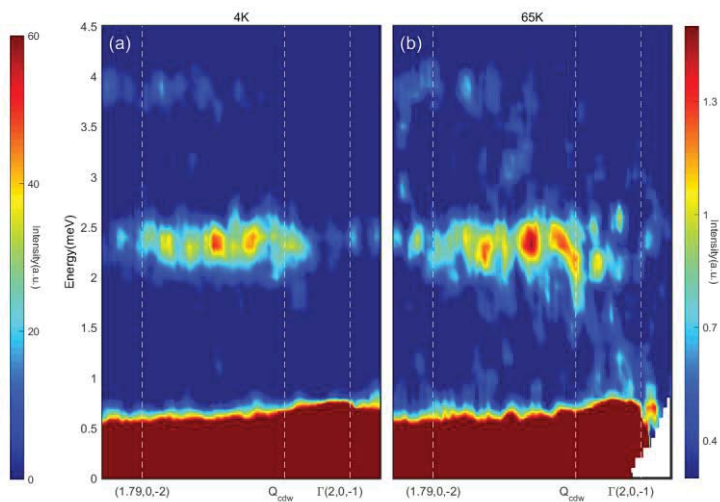


FIG. 3