Dear Editor:

Thank you for your kind cooperation in reviewing the manuscript: Novel idea of neutron polychromator and application for reflectometry and spectroscopy. The comments were helpful in improving the quality of the manuscript. I really appreciate the efforts of you and the reviewer for reviewing our manuscript. The manuscript has been modified according to the comments as listed from the next page and has been checked by an editorial service as the attached certification letter.

I hope that the revised manuscript will be accepted as the proceedings of the ECNS2023.

Sincerely,

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Replies to Reviewer's comments:

The authors describe a concept for a device for focusing a point like white beam source using an elliptical, monochromator in both SANS and reflectomtery. Unforunately they have not referenced or taken note of the work of Ott and Menelle from 2007 which describes a very similar idea in several different operating modes.
https://doi.org/10.1016/j.nima.2007.11.037
Nuclear Instrument and Methods A, 586m pp 23-30
"REFocus: A new concept for a very high flux neutron reflectometer"

We really appreciate the reviewer letting us know the reference. They proposed a polychromator with the combination of elliptic mirror and multilayer monochromator as in this study, which should be referenced in this paper as pointed out. As the way to make a polychromatic beam in the reference is slightly different from that of our study, the description to explain the difference is added as follows.

The second paragraph in the section 2.1

Prior to this study, the combination of elliptic mirror and multilayer as a polychromator for neutron reflectometry was proposed by Ott et al. [3]. In the study, they performed a Monte Carlo simulation with the optics that the beam size at the source was limited but a large focusing mirror was used. Because the incident angle to the mirror gradually increases with the distance from the center of the ellipse, the wavelength satisfying the Bragg condition also increases in the same manner. On the other hand, the wavelength dependence on the position is assumed to be corrected by controlling the layer thickness to compensate the wavelength satisfying the Bragg condition for the polychromator in this study. This correction allows us to use the monochromatic beam with the large beam divergence, while the beam divergence of a limited wavelength is very narrow before the correction. As a result, the polychromatic beam of the corrected polychromator with a wide virtual source can increase the beam flux compared to that of the previous work.

The end of the second paragraph in the section 3.1

Also, the concept of the REFocus reflectometer using a polychromator consisting of an elliptic mirror and multilayer monochromator is proposed. This reflectometer can accept a polychromatic beam with a wide incident angle to measure the reflectivity in a wide momentum transfer range at the same time. On the other hand, by using the wide incident angle, the specular signal is disturbed by the surface waviness and the off-specular signal is buried in the specular signal.

The authors should also make reference to papers describing similar concepts that make use of single crystal monochromators.
https://doi.org/10.1063/1.5089642
https://doi.org/10.1063/1.4901160
Section 3.2 relating to quasi-elastic neutron scattering should also be rewritten to take into account
and compare the performance of the proposed devices with the single crystal alternative.

Thank you for rising the reference again. The description to explain the difference between the polychromatic beam by the single crystal and by our idea is added as follows.

The end of the second paragraph in the section 3.2

Although the use of the polychromatic beam by a monochromator crystal are proposed [14,15], the energy band is very limited (less than ±10% from the center value). On the other hand, a wide energy band can be utilized in the polychromator, as will be discussed later.