Response to Reviewer 1 Comments

Dear Reviewer:

We appreciate you very much for your positive and constructive comments and suggestions on our manuscript entitled “Fabrication and properties of a bio-based biodegradable thermoplastic polyurethane elastomer”. (ID: polymers-497021).

On the basis of your recommendation and comments, we have revised the manuscript again, and the followings are our responses to your comments.

Point 1: Although the authors made justification to the reviewers, the readers (not limited to the reviewers) may still be confused by the novelty of the manuscript. Here are some advices to the authors:
First of all, if this is a novel bio-based biodegradable TPU, the author should address it clearly to take the credit;
Secondly, with regard to “…more flexibility…”, the authors clearly showed that carbon-carbon double bonds are more flexible than C-C single bond. But in the context of this manuscript, the flexibility of this synthesized novel TPU should compare to other TPUs; if the other TPUs don’t have such a double bond, then the TPU from this manuscript has the advantage. Comparison should always be “apple to apple” instead of “apple to orange”;
Thirdly, the authors should clearly address those novelties in the manuscript since the readers may not have such information, which can be part of the literature review in the Introduction Section.

Response to Point 1:

As suggested by the reviewer, we have revised the “Introduction” and some sections of “Results and Discussion” of manuscript to address the novelty of the BTPU clearly.

In the 4th paragraph of Introduction section, we have cited references of some TPUs which can not have good biodegradability and good elasticity simultaneously. Being different from those TPUs, the novel BTPU in this manuscript does have both good biodegradability and good elasticity.

Also, above traditional TPUs in “Introduction” section do not have carbon-carbon double bonds, and the elongations at break of those traditional TPUs (less than 300%) are lower than that of the novel BTPU (more than 800%, and up to 1300%) in this manuscript.

The revised last paragraph of “Introduction” section which address the novelty of this manuscript is as follows.
“Being different from above TPUs which can not have good biodegradability and good elasticity simultaneously, this paper, using some bio-based aliphatic monomers[32][33] and technologies of polyester esterification reaction and chain extension, designed and prepared a novel bio-based BTPU which does have both good biodegradability and good elasticity. The BTPU contains a novel soft segment of aliphatic polyester and a hard segment. Notably, compared to some soft segments with 1 to 3 polyester repeat units in some traditional TPUs [29][30][31], the novel soft segment of the novel BTPU comprises six kinds of aliphatic polyester repeat units and has good biodegradability and flexibility. Also, the fumaric acid is explored to synthesize the novel soft segment because the carbon-carbon double bond in molecular main chain has the effect on improving the molecular chain relaxation rates [34], leading to the more flexible soft segment. This paper also studied the effects of molecular
structure, molecular weight and soft segment ratio on the biodegradability, mechanical property and thermal property of the BTPU. This work can provide new research insights for developing environment-friendly and functional biodegradable polymer materials.

**Point 2:** Point 2, similarly, with regard to the word “superior” from “…superior biodegradability…”, the readers want to see the why the novel TPU is superior. However, such information cannot be found in the manuscript. Besides, comparison should always be “apple to apple” instead of “apple to orange”, otherwise, it is meaningless.

**Response to Point 2:** As suggested by the reviewer, we have revised the manuscript by introducing some references of some TPUs in the 4th paragraph of “Introduction” section and “3.5 Degradation property of BTPU” section in order to highlight the novelty of the BTPU prepared in this manuscript. Compared to those traditional TPUs with some shortcomings, the novel BTPU has superior biodegradability.

**Point 3:** Point 6, It is suggested that the authors change the wording and clearly say biomass residues (or similar words);

**Response to Point 3:** As suggested by the reviewer, we have revised the manuscript and introduced some literatures about the biomass residues for preparing some monomers.

**Point 4:** Point 8, even after the revision, the sentence doesn’t make sense from the grammar viewpoint. The authors should read carefully from the original article.

**Response to Point 4:** As suggested by the reviewer, we have corrected the sentence as follows, “The mass loss ratio of the rigid PU-F reached around 40% and 50% in the enzymatic experiments after 12 weeks”.

**Point 5:** Point 14, comparison should always be “apple to apple” instead of “apple to orange”, otherwise, if novel TPU is worse than the commercially available TPU, then the novel TPU does not gain advantage in this regard;

**Response to Point 5:** As suggested by the reviewer, we have revised the manuscript and introduced some literatures about thermal stability of TPU in section “3.4.2 Thermal stability of BTPU”. Compared to those TPUs, the novel BTPU in this manuscript has good thermal stability.

**Point 6:** Line 137, does the author mean “spinning” instead of “spining”?

**Response to Point 6:** Yes, we have replaced the “spining” with “spinning” in revised manuscript.

**Point 7:** Figure 7, does the author mean “quantity or mass” instead of “quality”?

**Response to Point 7:** Yes, we have replaced the word “quality” with “mass” in revised manuscript.

Again, the authors appreciate your time, recommendation, and construction comments.

Thank you so much.
Sincerely yours
Qingguo Wang