

Dear Symposium 6 Organizing Committee,

Thank you very much for taking time to organize this symposium and coordinate the review of our paper. We would also like to thank the reviewers for their critique of our manuscript. After reviewing the comments, we have made a series of changes to the paper in order to address the reviewer's concerns. Below is a list of the reviewer's comments, along with our response and changes to the paper based on those concerns. Below, reviewer comments are listed as R#C (i.e. R1C for reviewer 1 comment, and R2C for reviewer 2 comment) and our author responses listed as AR. Note that we have made changes to the paper based on each and every recommendation of the reviewers.

R1C: Including the discussion of TCPA may be more confusing than beneficial since it is not the focus of the paper. If this remains, an image of the helical configuration would greatly aid the comparison to the woven structure in Figure 2.

AR: We have chosen to keep the text about TCPA for context and because the "woven" structure in Figure 2 is actually a TCPA, but with little coiling, so that it acts as a torsional (rather than linear) actuator. We added text to explain this and to explain that Figure 2(b) shows a TCPA with weak coiling.

R1C: What happens during the annealing process? Are the polymers annealed while woven together? If the polymer is melting and restructuring, are there any risks of them fusing together or is the temperature low enough to avoid this?

AR: During the annealing process, the polymers are woven, but there is no melting or fusing. We added new text to explain this.

R1C: On page 3, top left, there is a missing figure reference.

AR: Thank you, this has been fixed.

R1C: Dimensions for Figure 4 will help with visualization.

AR: We noted the size of the monofilament in the text to give a sense of the size. We also added the most relevant dimension to that figure.

R1C: The data is presented as rotation – discussing what this rotation means (lifting, lowering the weight) will help with visualization as well. I see that increasing the temperatures increases the angle in both cases, but linking these to work done may be more intuitive for the reader.

AR: We added some discussion about lifting and lowering the weight and how it relates to the rotation angle. However, whether the weight is lifted during heating or cooling only depends on how the specimen is placed in the device and how the weight is wrapped around the spool, so the TPA could be designed to lift or lower upon heating depending on the use.

R1C: Page 6 left column, near the bottom – is there a reference for the Gough-Joule effect that was removed unintentionally? (sentence terminates with /).

AR: That was merely a typo, and has been corrected.

R1C: Additional insets on Figure 7 showing the position of the weight at the high and low temperatures will help interpretation of this plot.

AR: We chose not to include this, as we expect these type of actuators not to be used in a linear (lifting/lowering) manner, but rather a torsional way (twist/untwist something), and we think that is best understood by reporting the rotation. But we did include some text about how one could calculate the lift/lowering.

R2C: There are several format inconsistencies across the paper. The term "Figure" is split between several capitalization and lower case instances. There are multiple spelling mistakes throughout the paper which need to be addressed, such as "cab" instead of "cam" on line 22 of the abstract, "an" instead of "a" in line 6 of the introduction, etc. The word "results" is listed twice in a row in the second to last paragraph of the discussion section. This is not inclusive, and the entire paper should be reassessed for issues such as these. In particular the second paragraph of the experimental results section has confusing grammar and sentence structure.

AR: We have done a more complete proofreading of this paper and hopefully addressed all the grammar issues and inconsistencies.

R2C: The content of the paper is concise, but at no point is the material for the fibers used clearly given.

AR: That was an oversight and has been corrected.

R2C: Additionally it could be noted how the specific chemical structure of the polymer used changes as a result of the twisted configuration would help more clearly understand the actuation mechanism.

AR: We added some text and a reference about the chemical structure of drawn nylon. While drawn polymers are well studied, the effects of twisting on the microstructure of the fibers are not known.