Dear Prof. Zhang,

Thank you for your e-mail with the reviewers' comments and suggestions. We have revised this manuscript carefully according to the reviewers' comments and suggestions.

For answering the comments, we made some changes and marked them in the revised manuscript. All the responses to the comments and suggestions from the referees point by point were integrated into this response letter. Please see the details as follows.

The revised manuscript with changes and marks was also uploaded as a supplementary file for reviewers.

Your consideration would be much appreciated.

We expect the current format can meet the requirements of "*Nanomaterials.*"

With my best regards,

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Reply for Reviewer 1

Open Review	(x) I would not like to sign my review report ( ) I would like to sign my review report
English language and style	( ) Extensive editing of English language and style required (x) Moderate English changes required ( ) English language and style are fine/minor spell check required ( ) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	( )	(x)	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	(x)	( )	( )	( )
Are the results clearly presented?	(x)	( )	( )	( )
Are the conclusions supported by the results?	(x)	( )	( )	( )

General comments: The manuscript of Cao et al. describes the preparation of flexible silver adhesive through the mixing of PANI/cellulose composite with silver powder. The addition of PANI structures in the silver ECA resulted in a significant increase of conductivity as well as provides enhanced mechanical properties. The work is well written and without a doubt deserves the publication after the following revision:

Comment 1: 1 The information about the silver flakes should be added: the SEM measurements should reveal the shape and size of silver nanostructures.

Reply：Thank you for your suggestion. The shape and size of silver flakes were given in Support information in Figure S2.

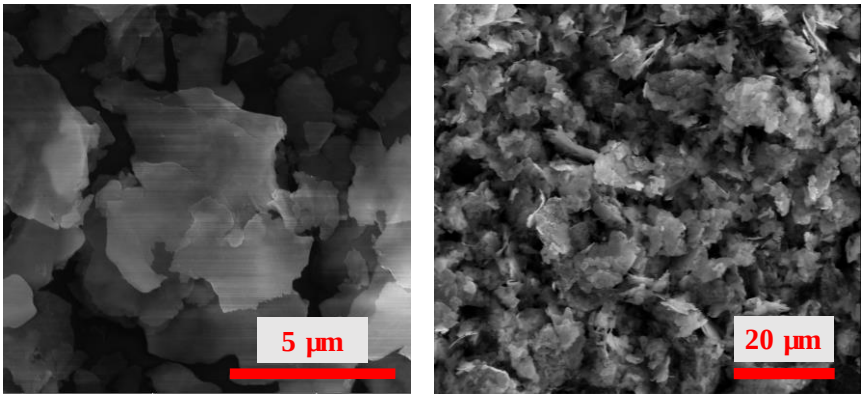


Figure S2. The structure of the silver flakes used in this study.

Comment 2: The mutual distribution of PANi and Ag in created ECA should be characterized. The utilization of EDX mapping (in addition to provided SEM images) is suggested.

Reply：Thank you for your suggestion. The utilization of EDX mapping is a suitable choice for characterizing the mutual distribution of PANi and Ag in created ECAs. However, the elements (C,N,O) in our synthetic PANI@CNs material are consistent with the TPU resin material in the ECAs, making it difficult to determine the dispersibility of PANI@CNs in TPU and silver flakes using an EDX mapping method. Based on the above analysis, we used SEM to characterize the dispersibility of PANI@CNs with silver flakes in the ECAs. In Figure 6b, PANI@CNs nanowhiskers have no visible aggregations in the polymer matrix. PANI@CNs were well dispersed among the silver flakes.

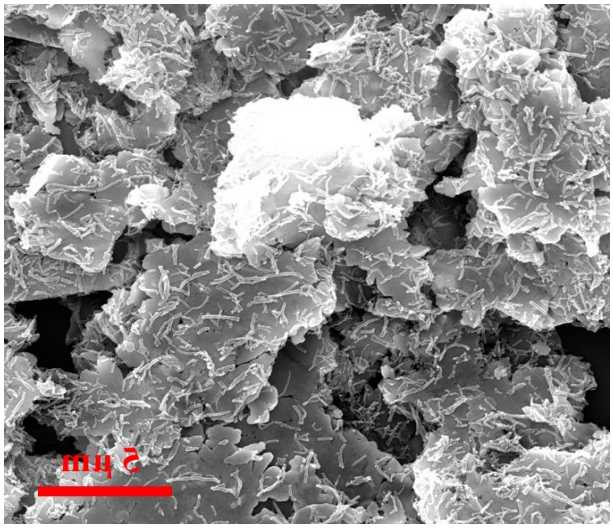


Figure 6b The SEM images of PC-1ECAs

Comment 3: Since the formation of the electric barrier between Ag and PANi can be expected, the utilization of voltammetry measurements is recommended. Obtained results can give a more precise explanation of the observed conductivity increase.

Reply：Thank you for your suggestion. The data for voltammetry measurements were added in the manuscript.

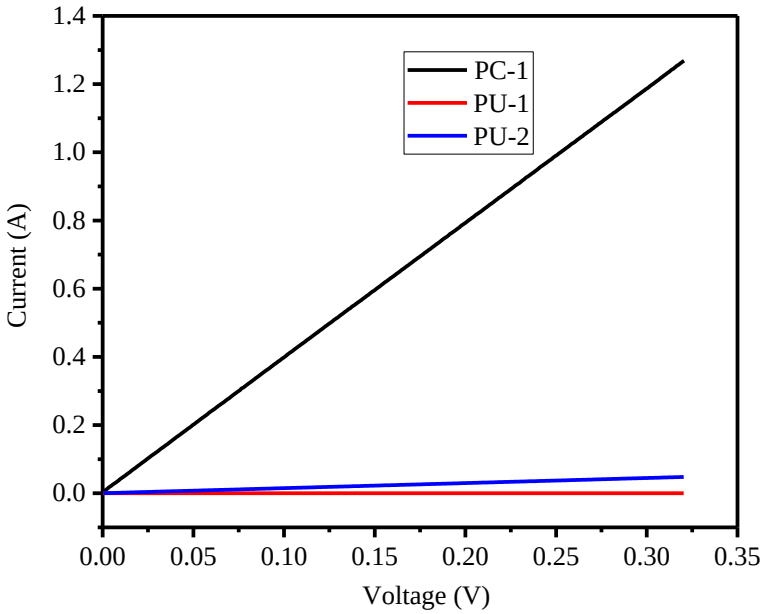


Figure S4. The current-voltage curves of a few ECAs with different silver contents.

Comment 4: Detailed compositions for the 159 prepared ECAs with different compositions were given in Table

Reply：Thank you for your suggestion. The Detailed compositions of prepared ECAs were listed in Table 1 in the manuscript.

Table 1. The compositions for the prepared ECAs

Sample code	TPU resin (wt%)	Ag (wt%)	PANI@CNs (wt%)	PANI (wt%)
PC-1	43.5	55	1.5	0
PC-2	33.5	65	1.5	0
PC-3	44.5	55	0.5	0
PC-4	44	55	1	0
PC-5	43	55	2	0
PU-1	45	55	0	0
PU-2	35	65	0	0
P-1	44.5	55	0	0.5
P-2	44	55	0	1
P-3	43.5	55	0	1.5
P-4	43	55	0	2

Note: the hybrid adhesives containing Ag flakes and PANI@CNs were named as PC series; the adhesives only containing Ag flakes were named as PU series; the hybrid adhesives containing Ag flakes and PANI particles named P series.

Comment 5: The preparation of micro/nanostructures of conductive polymers has not been carefully described in the Introduction. The following articles are recommended: Long, C., et al. Advanced Functional Materials, 2014, 24(25), 3953-3961; Shi, Z., et al. RSC Advances, 2012, 2(3), 1040-1046; Děkanovský, L., Advanced Functional Materials, 2019 29 (31) 1901880

Reply：Thank you for your suggestion. The preparation of micro/nanostructures of conductive polymers were added in the Introduction. These highly relevant articles recommended by the reviewer were cited in the manuscript.

Comment 6: AFM, – Fig. 3, please change the color of scale-bars

Reply：Thank you for your suggestion. The color of scale-bars in AFM graphics has been changed.

