We thank the Reviewers and Editor for their constructive comments. Below please find our responses to each comment.

Editorial comments:

1)Audio issues:
•2:53-3:31 – The audio here is lower than the rest of the voice-over in the video. It should be normalized.

We have fixed the audio issues.

2)Please make sure that your references comply with JoVE instructions for authors. In-text formatting: corresponding reference numbers should appear as superscripts after the appropriate statement(s) in the text of the manuscript. Citation formatting should appear as follows: (For 6 authors or less list all authors. For more than 6 authors, list only the first author then *et al.*): [Lastname, F.I., LastName, F.I., LastName, F.I. Article Title. *Source*. **Volume** (Issue), FirstPage – LastPage, doi:DOI, (YEAR).]

We have corrected the format of the references. Regarding Reference 1, that article is in press and we expect it to have full coordinates shortly (probably on the time scale for publication of this article if it is accepted).

3)Please take this opportunity to thoroughly proofread your manuscript to ensure that there are no spelling or grammar issues. Your JoVE editor will not copy-edit your manuscript and any errors in your submitted revision may be present in the published version.

Thank you we have made some minor corrections to spelling and grammar.

Reviewers' comments:

Reviewer #1:
Manuscript Summary:
In this article, the authors demonstrate an approach to create and characterize low dimensional oxide structures. This is of great importance to the emerging field of oxide nano-electronics/spintronics. Actually, it should also be potentially applicable to other non-oxide material systems, as long as there is resistance hysteresis behavior. Additionally, I also enjoyed watching the video manuscript.

Major Concerns:
There is no major concern in this version.

Minor Concerns:

However, there are a number of things required to be corrected or improved. I list them below:
1. Keywords. In order to match the title, "oxide nanostructures" is a better keyword than "oxide semiconductor";
We have made this change.

2. Short abstract. In the first sentence, replace "oxide interfaces" by "oxide nanostructures", because "interface" will be difficult to pick up immediately for general audience without introducing it.
We have made this change.

3. Long abstract. In line 77, the "AFM" abbreviation is not defined yet.
We replaced the abbreviation with “atomic force microscope”

4. Line 123 in Protocol & line 195 in Representative Results. There is inconsistency about LaAlO3 (LAO) thickness. In these two lines, LAO are 3.3 unit cells. However, in video and the final comment, LAO are 3.4 unit cells. This typo should be corrected.
We have corrected step 2, which now states “3.4 unit cells”.

5. There are at least four places with texts of "Error! Reference source not found.". I believe they are figure references. If they are not about Figures, figure references should be properly included there.
The unlinked referenes have been corrected.

6. There are occasionally typos. In line 213, space should be added before "mV". In line 172, it should be"Use", not "Us".
Both typos have been corrected.

7. In line 228, add representative references about "other publications"
The sentence now reads: “Details about the physical interpretation for this class of device will be described elsewhere.”

8. The reference format is very odd to me. There are seems like a lot of format errors. Just an example, some are with DOI, some not.

Thank you for pointing out these inconsistencies. They have been corrected in the revised manuscript.

9. In figure 2, it is much better to add more labels to describe A and C.

We have added more labels.

10. Figure 5's Axis labels need to be improved. The Vsg axis is lack of unit of V. For the V4t axis, "-33.03z" is better replaced by "0" or "0u". Move "dI/dV" label closer to color bar and assign a unit to it.

The images shown here are screen captures of the actual display used in the experiment (they appear this wa in the video). We have added information about the units for all of the quantities and corrected the description of the quanitity (differential conductance rather than differential resistance).

Additional Comments to Authors:
There is no additional comments to Authors.

Reviewer #2:
The movie and manuscript JoVE51886R3 by Akash Levy et. al. describe the process of creating conductive nanostructures by applying voltages to a conductive atomic force microscope tip and locally switching the LaAlO3/SrTiO3 interface to a conductive state. The goal of this publication is to provide a detailed description of how these conductive nanostructures are created and measured. The details provided here should are sufficient to allow similar experiments to be performed using this technique.

I think that this work is well presented and deserves to be published in the Journal of Visualized Experiments (JoVE). However, there are some issues that should be addressed prior to publishing this work.

General Comments:

1) Some editing is required in order to make stronger and more concise statements.

We have attempted to make the language of the manuscript stronger and more concise.

2) References for the figures are not found.

The figures are not taken from other publications.

3) There is no detailed description of how the structure can be erased, although it is mentioned as one of the key features of this technique in the introduction, and very briefly shown in the movie.

Thank you for pointing out this missing information. We have added a description of the erasing procedure: “Generally, c-AFM writing is performed with positive voltages applied to the AFM tip, while, erasing is performed using negative voltages. “

4) Since the sputtering was described in details, the manuscript should include details, or at least a reference to the parameters used in the c-AFM such as applied voltage, scan speed etc.

We have included some typical parameters in the nanostructure writing receipe.

5) There is no conclusion section in the paper and the conclusion section in the video is insufficient. The last paragraph (line 281) states that "wide range of experimental directions that can be explored". Please elaborate.

It is our understanding that the last section should be for "Discussion" rather than conclusion. We have removed the last sentence to focus on the wide family of devices that have already been demonstrated.

6) This description could be upgraded by including some level of discussion of the physics involved, to set this work in its context. The extent of this discussion depends on the editor and the preference for this journal. For example – there is no mention of the basic physics that makes this writing possible. Why do voltages have such an effect on the LAO/STO surface?

We felt that the main purpose of this video article was to describe the methods used to create the structures. Deeper discussion of the basic physics of the devices, or even the writing process itself, has been the subject of other publications (e.g., Ref. 21).

7) The level of details in the various sections is not proportional (e.g. in section 4 – no details about the writing parameters vs. too many details about opening files)

We have included more details about the writing parameters.

Specific Comments:
Editing is needed in the following examples:
76-80: Please revise this section to make a stronger statement or a stronger argument for this publication.

The purpose of the publication is to describe methods by which LAO/STO structures are created and measured. The lines 76-80 are summarizing a process that is described in more detail in the manuscript and illustrated visually in the video. The last sentence (79-80) makes it clear to the reader the scope of the manuscript and the video, and (we hope) will facilitate the process of replicating these results in other laboratories.

108: "…are created is presented" rephrase.

We have rephrased the sentence to read: “A detailed description of the nanoscale fabrication procedure follows.“

152: " Calibrate the times should to produce the desired Ti and Au thicknesses." – remove “should”.

We have fixed this sentence which now reads: “The times should be calibrated to produce the desired Ti and Au thicknesses.”

Line 187: consider switching with line 186

Yes, those parts were written out of order--we have swapped them.

Additional references needed for the following statements:
99: "…is often used to create quantum dots in III-V semiconductors."

We added a representative reference.

Error in figure references: Lines: 130, 169, 177, 178.

We have corrected these errors.

Figure 2: scale bar is missing in the microscope pictures

Additional information to consider including:
143: what is in the calibration run? (AFM? Elipsometry? Profilometry?).

We have added information: “If the Ar+ etching rate is not calibrated, a calibration run should be performed to ensure that the correct amount of material is removed. Etching depth should be determined using AFM or equivalent profilmetry.”

Is the process repeatable and stable?
147: what is the sputtering pressure? Temperature? (Room temperature should also be stated for clarity).

We include this information now:

Deposit 4 nm Ti, then 25 nm Au onto the samples so that the Au makes electrical contact with the exposed STO layer. The sputtering pressure is in the range 2-6 x 10^{-7} Torr, and the sputtering takes place with the sample at room temperature. Pre-sputter Ti for 10 minutes with shutter closed at 100

W, then open shutter and sputter for 20 s at 100 W. Upon completion, immediately pre-sputter Au for 1 minute at 50 W then sputter Au for 30 seconds to the samples at 50 W. The times should be calibrated to produce the desired Ti and Au thicknesses.

Video Comments:

• There is a bit of a problem with the sound between minute 03:00 to 03:35 the voice in the video is much quieter and less understood

We corrected the sound issues, thank you for pointing them out.

• The conclusion should be expanded. Suggestions: speak about the versatility of this technique and about future applications.

Our principal aim for this publication was to describe the methods rather than provide enormous detail about all of the possible structures that could be created. The manuscript itself references a large number of devices that have already been created.