

Tricks of the Trade Inexpensive Tungsten Needle Holder

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Being an instructor at McCrone Research Institute, I am often exposed to people with wonderful ideas for techniques and tools they use to solve problems in their own laboratories. I often feel that I benefit from the courses to the same degree the students do. During a course in January 2007, I learned of an excellent idea for a tungsten needle holder: a mechanical pencil!

I recently went to the local grocery store to purchase some mechanical pencils so I could try this out for myself. One of the most important concerns when purchasing mechanical pencils to be used as tungsten needle holders is the diameter of the graphite the pencil will accept. This is critical for the pencil to be able to hold the sharpened tungsten. The diameter of tungsten wire we normally use at the Institute is 0.51 mm. Therefore, I purchased packages of Bic (Bic USA Inc., Milford, CT), Paper Mate (Sanford LP, Oak Brook, IL), and Pentel (Pentel of America, Ltd., Torrance, CA) mechanical pencils with a 0.5-mm graphite size (Figure 1).



Figure 1: Three types of mechanical pencils purchased from the local grocery store.

To transform an ordinary mechanical pencil into a tungsten needle holder, the following steps must be taken. First, the advance button must be pressed several times until there is enough graphite extending out of the tip of the pencil to grab hold of it with one's fingers. Next, while depressing the advance button, the graphite is removed by pulling the advanced graphite from the tip of the pencil. Finally, the dull end of a sharpened tungsten needle is inserted into the tip of the pencil while the advance button is being held down; the further the needle is put into the pencil, the better. If the needle is barely protruding from the tip, the advance button can be pushed to expose more of the needle (Figure 2).

For evaluation, I moved a few particles with a pencil of each brand and rolled the pencil in my hand in the same way one might roll a regular tungsten needle holder to put a particle down. All of the pencils worked well to hold the needle in place while particles were

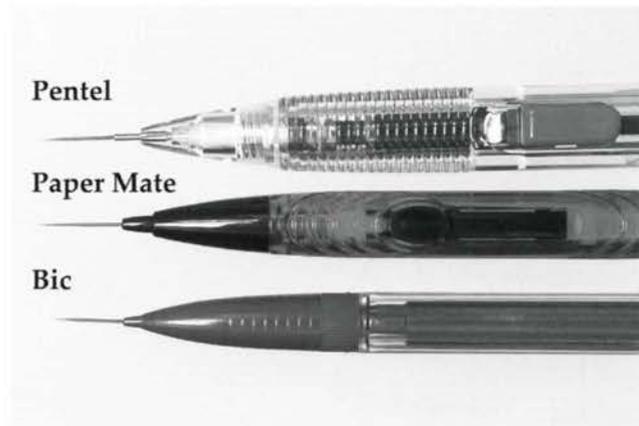


Figure 2: The three brands of mechanical pencils transformed into tungsten needle holders.

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moved. They each had a bit of spring or movement when pressure was applied, but not so much movement to be a nuisance.

Of the three brands, I preferred the Pentel. The other two worked well, but when rolling the needle with some pressure against the substrate to which the particle was being transferred, I noticed the needle would not rotate with the pencil body. Simply put, the pencil could not hold the needle tightly enough. I did not have this problem with the Pentel. The Paper Mate pencil was a bit difficult to rotate because the side advance button got in the way of a smooth rotation between the fingers. Although, the Pentel has a side advance button, it is far enough up the shaft of the pencil to be out of the way. The Pentel also accepted an old Sharpie (Sanford, Bellwood, IL) pen cap to keep the tip of the tungsten needle safe (Figure 3).

Total cost per holder: Bic, \$0.59; Paper Mate, \$0.82; Pentel, \$2.40.



Figure 3: Pentel- brand "tungsten needle holder" with Sharpie cap.