TWO NEW TYPES OF HOLDERS USED IN GRINDING THIN SECTIONS[1]

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Two highly satisfactory thin-section holders have been constructed and put into use. These help materially in the ease of preparing petrographic thin sections. The boron carbide holder used for coarse grinding has an automatic section-thickness control. This automatic control eliminates the many time-consuming inspection-correction steps during coarse grinding and assures a uniform product for finish grinding. The plastic holder used for finishing aids in handling the section on the lap. The slides are less likely to pull free when this holder is used than when the slides are hand-held. This results in less breakage. Both of these holders are inexpensive and their use does not require modification of pre-existing equipment.

BORON CARBIDE HOLDER

The holder is made of two blocks of aluminum joined by two $\frac{1}{4}$-inch D stainless-steel pins so that one block is free to slide on the pins, while the other remains stationary (fig. 1). A rectangular depression machined from the center of the blocks accommodates a petrographic slide with its mounted chip. Two strips, $3 \times \frac{1}{2} \times \frac{3}{16}$ inch, are made from boron carbide wheel-dressing sticks. These strips are cemented with an epoxy cement into grooves in the top edges of the aluminum blocks. The top surfaces of the strips determine a plane, and the position of this plane with respect to the bottom of the depression (alignment platform) determines the over-all thickness of the slide. The sample cannot grind below this plane because the boron carbide is harder than the abrasives (emery or silicon carbide) used for lapping.

The over-all dimensions of the boron carbide holder are 3 inches long, 2 inches wide, and $\frac{3}{4}$ inch thick. The distance between the carbide top surface and the alignment platform is 0.060 inch for this particular holder. A small groove is milled out around the platform to facilitate precision alignment. The outside edges of the boron carbide strips are rounded to prevent them from gouging the lap surface.

The slide with its mounted rock chip is placed on the alignment platform. Both the platform and the back of the slide have to be clean to obtain the desired final thickness. The slide is held in the holder by sliding the movable block up against the slide edge. The slight finger

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pressure against the edges of the holder, as the slide is being ground, is sufficient to hold the section in place. The holder and sample are held against the revolving lap, which is charged with the grinding abrasive. As grinding progresses the boron carbide eventually comes in contact with the lap surface. If grinding is not perfectly parallel, one corner or edge will touch the lap first. Continued grinding of the sample corrects this wedging. No particular corrective measure need be taken on the

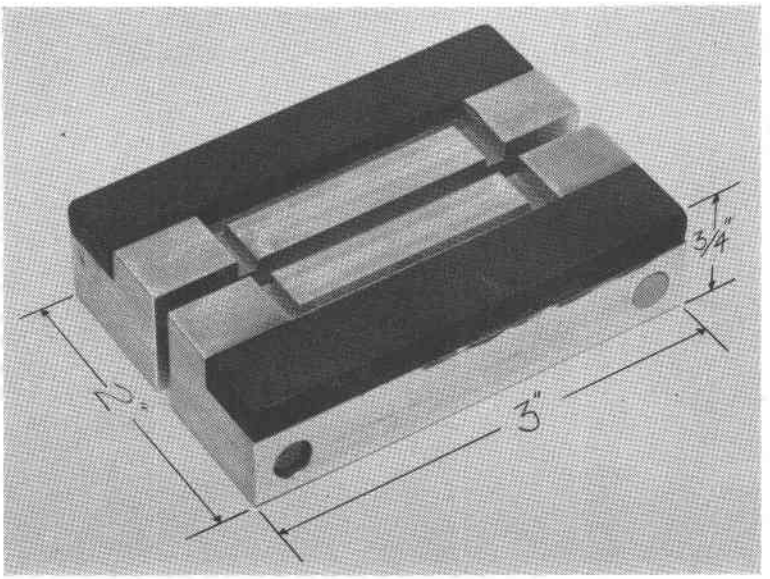

FIG. 1. Boron carbide holder.

part of the operator. The operator knows when the section is finished because of the increased drag of the holder on the lap surface. Doming of the rock section is also automatically corrected and the finished section, for this stage in the procedure, is planar, parallel, and has a uniform thickness. Tolerances are easily controlled to ± 0.0005 inch. The finished dimension of 0.060 ± 0.0005 inch is the sum of the glass, cement, and rock thicknesses. If irregularities occur in either the glass slides or in the cement, the thickness of the rock slice will be different from that expected. For this reason it is not considered practical to attempt finish grinding with this holder.

There have been difficulties in grinding two types of materials with this device: sandstones and ultramafic rocks. For sandstones it is customary in the laboratory to mount sandstone chips a little colder than

our usual samples. This results in an extra-thick layer of cement between the rock chip and the glass slide. The extra cement thickness causes the rock slice to be thinner after grinding when this holder is used but a holder with a lower alignment platform could be built to accommodate these samples. Ultramafic rocks are troublesome because they have a tendency to pluck during grinding. This characteristic requires more care in grinding than with other samples. A holder producing thicker sections would also partly solve this problem.

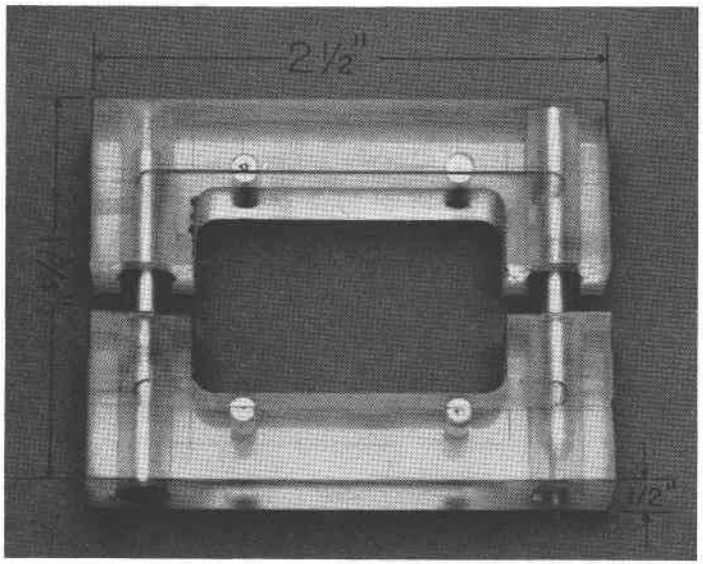

FIG. 2. Plastic holder.

PLASTIC HOLDER

After the sections have been ground with the boron carbide holder on the coarse abrasive they are gound to 30-micron thickness using a finishing holder. At present this procedure is accomplished in two grinding stages, using first 600 SiC, and next 303½ emery. Preliminary results indicate that it will be possible to use an automatic thickness holder during the 600 SiC stage.

The plastic holder, Fig. 2, was machined from a block of methyl methacrylate plastic and has over-all dimensions of $2\frac{1}{2}$ inches long, $1\frac{3}{4}$ inches wide, and $\frac{1}{2}$ inch thick. The plastic block is in two pieces that slide on two $\frac{1}{4}$-inch D stainless-steel pins. A rectangular hole, $1\frac{1}{2}$ by $\frac{3}{4}$ inches and centrally located, was cut out to allow microscopic examina-

tion of the section in process without removing it from the holder. In the place of the alignment platform, a shelf 0.03 inch deep, $1\frac{7}{8}$ inch long, and $\frac{1}{16}$ inch wide was milled into the edge of the rectangular hole to grip the slide. Four $\frac{1}{8}$-inch D brass pins help in holding the section by preserving a sharp shoulder edge on this shelf.

The holder is used in much the same manner as the boron-carbide holder except that the thickness and uniformity are not controlled. During grinding the slide is periodically checked with a petrographic microscope in the conventional manner. The slide is not removed from the holder during inspection.

SUMMARY

The amount of skill required for the first grinding stage is less than that required when the thin section is processed in the conventional manner. The process is accelerated due to the elimination of many inspection steps during coarse grinding. Because a uniform section results from using the automatic thickness holder during coarse grinding, the finishing stage can be accomplished with less corrective measures. Holders used for finishing aid in ease of handling the sections as they are ground. Both of these holders have been used in practice and aid materially in the preparation of petrographic thin sections.

GENTHELVITE FROM COOKSTOVE MOUNTAIN, EL PASO COUNTY, COLORADO*

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In February 1951 a small but highly modified crystal of genthelvite $Zn_4Be_3Si_3O_{12}S$, (Fig. 1) was found on a northeast-trending spur of Cookstove Mountain in the $NE\frac{1}{4}$ $NW\frac{1}{4}$ $NW\frac{1}{4}$ sec. 4, T. 15 S., R. 67 W. (U. S. Geological Survey Manitou $7\frac{1}{2}$-minute quadrangle), El Paso County, Colo. Another occurrence of genthelvite from El Paso County was recently reported (Glass and Adams, 1953), but because of the rarity of genthelvite, further discussion on the mode of occurrence and crystallography is thought to be warranted.

The genthelvite crystal was taken from a pegmatite in the Pikes Peak granite. The pegmatites on the northeast-trending spur of Cookstove Mountain crop out in a narrow north-northwest-trending belt that seems to be part of a larger system of pegmatite dikes. Three places along this north-northwest-trending system, that are well known to mineralogists

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