B75-10529

NASA TECH BRIEF

NASA Pasadena Office

Collimation of Electron and X-Ray Beams Using Zeolite Crystals

Zeolite crystals can be used to collimate electron and X-ray beams [see NASA Tech Brief B75-10239 (NPO-13532)]. Faujasite, a naturally occurring crystal in this group, provides the structure necessary for the collimation.

The faujasite structure consists of sodalite cages which form a diamond-type lattice that is repeated throughout the crystal (see Figure 1). Pores in the crystal structure are oriented, effectively forming parallel channels throughout the crystal length. These channels are approximately 9 Å in diameter. Their interior surface consists of oxide ions which produce a negative pore surface.

As shown in the simplified drawing in Figure 2, electrons or X-ray photons directed at the face of the crystal may enter the channels A through N. Those entering the channels along the channel axes are transmitted through, while those striking the crystal structure are stopped. If the photons or the electrons enter a channel at an angle to the channel axis, they are alined by the negative surface charge. The resulting output on the other side of the crystal is collimated.
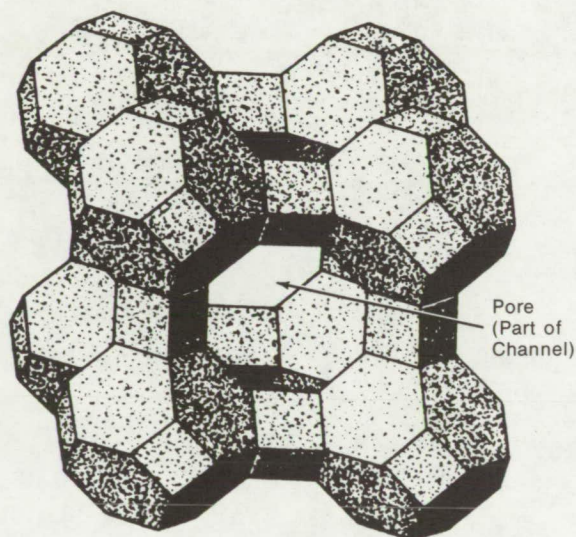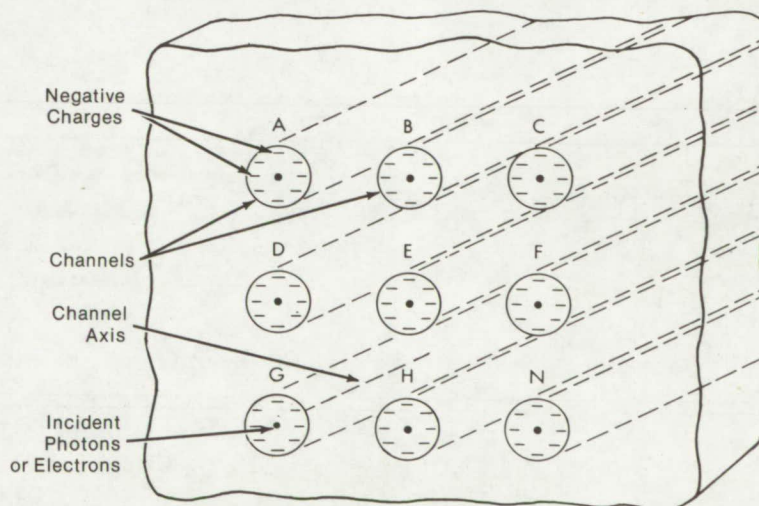

Figure 1. Sodalite Cage

Pore (Part of Channel)

Negative Charges

Channels

Channel Axis

Incident Photons or Electrons

Figure 2. Simplified Crystal Diagram

(continued overleaf)

Note:
Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
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Patent status:
NASA has decided not to apply for a patent.

Source: F. J. Grunthaner of
Caltech/JPL
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Categories: 03 (Physical Sciences)
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