doi:10.1017/S1431927619003465
Microsc. Microanal. 25 (Suppl 2), 2019

Digital Camera System in Transmission Electron Microscope

Cheolsu Han[1], Jong-Man Jeung[1], Jin-Gyu Kim[1] and Sang-Chul Lee [1]

[1.] Korea Basic Science Institute, Daejeon, Republic of Korea.
* Corresponding author: cshan72@kbsi.re.kr

Transmission electron microscope (TEM) is powerful tools in nanometer science and technology [1]. We can see an inside structure of specimen using the TEM. The internal structure of specimen can be observed by transmitting an accelerated electron beam through the thin specimen and magnifying and visualizing it with several electromagnetic lenses. However, the magnified specimen image cannot be seen by the human eye because it is realized by accelerated electron beam. For this reason, most of the TEMs are equipped with viewing components such as fluorescent screens, films, and digital cameras. The fluorescent screen located in the viewing chamber are mainly used to focus the specimen image or to locate the region of interest of the specimen. The digital camera mounted below of the viewing chamber are mainly used for microscopically observing the specimen image or for recording it as a quantitative digital data [2, 3].

In this presentation, we introduce a homemade TEM camera system. There are a digital camera and a hybrid cooling system in the homemade system. The digital camera consists of a fiber optical coupling coated with a phosphor (P47, ProxiVision GmbH, Germany) on an image sensor, a charged-coupled device (CCD, FTF2021, Teledyne DALSA, U.S.A.), a homemade deriving board and an embedded control system (NI-7932R, NI-6583, National Instruments, U.S.A.). The hybrid cooling system has an active water cooling system and a pettier cooling system. The application window program that controls and measures all systems is developed with LabVIEW (National Instruments, U.S.A.).

Figure 1 shows the homemade TEM camera system and a commercial TEM (JEM-1220, JEOL Ltd., Japan). We obtained a TEM image (14-bit, 2044x2040 pixels, 6 fps) using by the homemade TEM camera system on the commercial TEM. The sample used in this test is a magnification calibration diffraction grating replica (Product No. 607, TED PELLA, INC., U.S.A.).

Figure 2 shows the hybrid cooling system. The hybrid cooling system is controllable to -30℃ [4].

References:

[1] DB Williams et al., in “Transmission Electron Microscopy: A Textbook for Materials Science”, (Springer) Ch.7.
[2] GY Fan and MH Ellisman, Journal of Microscopy **200** (2000), p. 1.
[3] M Vulovic et al., Cryst., **D66** (2010), p. 97.
[4] This research was supported by Korea Basic Science Institute Grant No.(D39612).

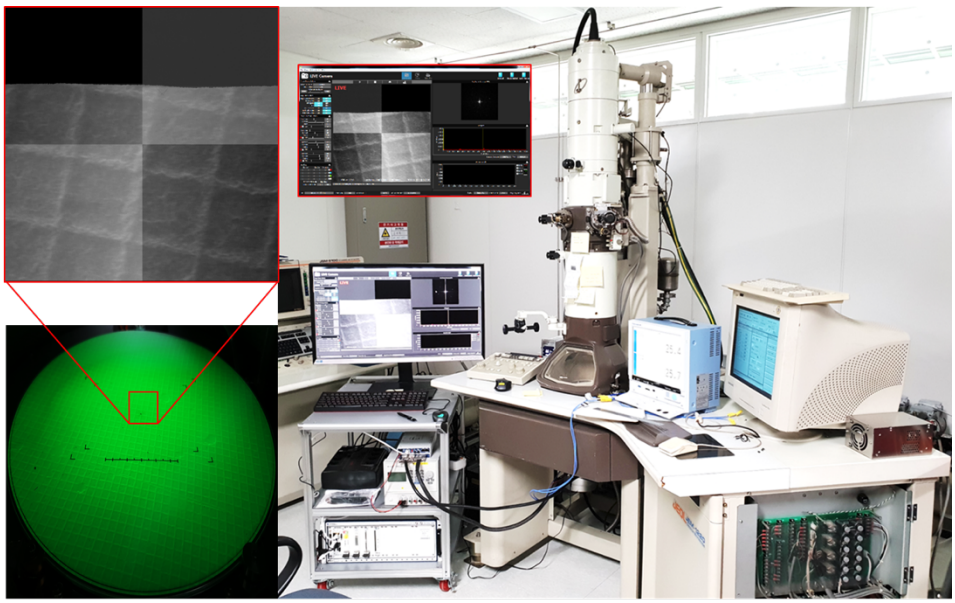

Figure 1. Homemade camera system.

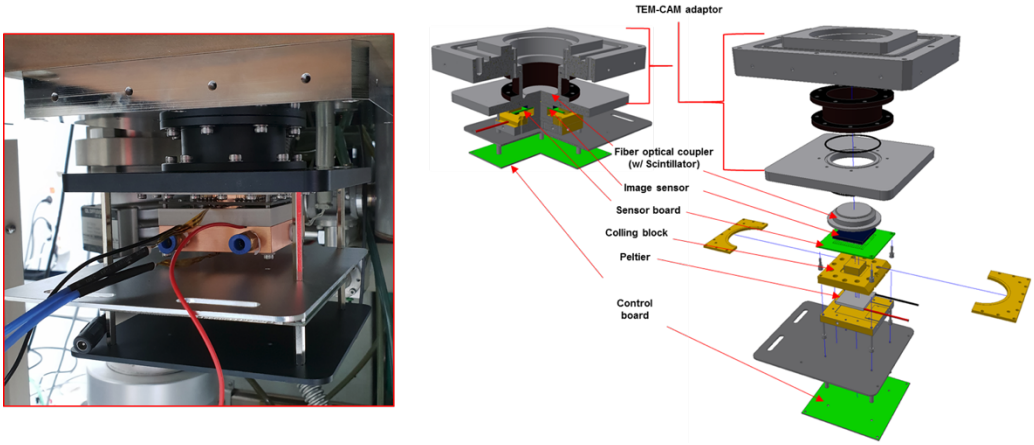

Figure 2. Hybrid cooling system.

https://doi.org/10.1017/S1431927619003465 Published online by Cambridge University Press