

January 31, 2025

To: IEEE History Committee, Dr. Tomohiro Hass, Advocate

From: Dr. Larry F. Weber, IEEE Life Fellow

Re: IEEE Milestone Proposal: Color Plasma Display, Docket # 2024-36

I am very pleased to review this proposal. Let me start by providing my background. I have spent my entire professional career working on the Plasma Display Panel (PDP). I was a student of the two professors who invented the PDP in 1964 at the University of Illinois: Prof. Donald L. Bitzer and Prof. H. Gene Slottow. I first met them as an undergraduate at Illinois in 1966 and started working on the PDP in 1969 under their direction. My Masters and PhD theses were both on the technical aspects of the PDP. When I graduated in 1975, I continued as an Assistant Professor at Illinois and became the director of the Plasma Display Research Lab at the University's Computer-based Education Research Lab. In 1987 I founded a company I named Plasmaco which acquired the world's largest plant for manufacturing PDPs from IBM. I served as the CTO of Plasmaco from 1987 to 1993 where we developed and manufactured monochrome PDP computer display products. From 1993 through 1996 I served as President and CTO of Plasmaco and I developed some key technology to make very-high contrast-ratio color PDPs. Panasonic needed this technology and so we sold Plasmaco to Panasonic in 1996 and I became President and CEO of the Plasmaco Division of Panasonic from 1996 until I retired in 2004. Under Panasonic, we were responsible for transferring the Plasmaco technology and know-how to Panasonic so that they could manufacture Plasma TV's (the color embodiment of the PDP). This worked very well and Panasonic became the world's largest manufacturer of Plasma TVs until 2014 when PDP manufacturing was terminated by all the world's PDP manufacturers.

I received the following major awards and honors for my work on PDPs: IEEE Fellow in 2002, Society for Information Display (SID) Fellow in 1989, the IEEE Daniel E. Noble Award in 2009, the SID Karl Ferdinand Braun Prize in 2000, the Consumer Electronics Association Hall of Fame Award in 2010 and the University of Illinois Engineering College Hall of Fame Award in 2014. I served as the President of the Society for Information Display for a two-year term starting in 2006.

Fujitsu was a major licensee of the original University of Illinois 1964 PDP patent and so there was a close relationship between the two institutions. As a student and as a young professor I met many engineers from Fujitsu. Dr. Tsutae Shinoda was one of them. I first met Dr. Shinoda's professor and significant mentor, Prof. Uchiike (mentioned in the proposal), in 1973 when he presented his original MgO paper at the IEEE IEDM. I got to know Prof. Uchiike especially well during the one year that he studied the PDP at the University of Illinois in 1978. I first met Dr. Shinoda in the 70s through Prof. Uchiike. But I started to know Dr. Shinoda very well when I visited Japan for the first time for three weeks in 1983 with one of the PDP inventors, Prof. Slottow. From then on, I paid close attention to Dr. Shinoda's work and publications and we would frequently chat with each other at various display conferences. Over the years we have served together on many display committees. We were both regarded as pioneering PDP experts by the international display community. In many ways we were competitors but we also became good friends.

I will now address the IEEE History Committee's specific questions:

**1. Is suggested wording of the Plaque Citation accurate?**

Yes, I find that it is indeed technically accurate, but I would like the Committee to consider a modification. The inventors of the PDP at the University of Illinois named their invention the Plasma Display Panel and so it has historically been referred to as the PDP by the technical display community. However, primarily because of the widespread popular success of the color PDP as developed by Fujitsu and Dr. Shinoda, the world's TV consumers and the popular news and entertainment media began calling the color PDP the "Plasma TV". While the term "color PDP" is technically correct, I feel that it is more appropriate for the benefit of the expected wide background of the audience viewing this plaque to use the now more popular term: Plasma TV. So, I propose the wording be modified to become:

A 21-inch color Plasma TV was first commercialized by Fujitsu in 1993. The practical realization of Plasma TVs was made possible by two innovative technologies: the three-electrode surface-discharge device and the Address-Display-Separated grayscale method, developed by Tsutae Shinoda. This achievement enabled the development of large-screen flat-panel displays, and made a major contribution to the arrival of the era of large wall-mounted TVs.

**2. Is evidence presented in the proposal of sufficient substance and accuracy to support the Plaque Citation?**

Yes, I find the proposal presents overwhelming evidence to support the citation. In addition, my personal observation of the development of the PDP over 40 years strongly supports the citation. The proposal cites reference to an invited paper I published in 2006: [24] Larry F. Weber, "History of the Plasma Display Panel," IEEE Transactions ON PLASMA SCIENCE, VOL.34, NO.2, pp.268-278,(2006), [https://ieeemilestones.ethw.org/w/images/a/a2/%E3%89%94\\_History\\_of\\_the\\_plasma\\_display\\_panel.pdf](https://ieeemilestones.ethw.org/w/images/a/a2/%E3%89%94_History_of_the_plasma_display_panel.pdf) . Consistent with the proposal, this paper has figures 14, 18, 22, 23 and 25 showing significant contributions by Dr. Shinoda and his team at Fujitsu toward the development of the Plasma TV.

**3. The Citation mentions Tsutae Shinoda, as inventors of the Color Plasma Display. Do you agree with this Citation?**

Yes, I fully recognize Tsutae Shinoda as the main person who made the key technical contributions and inventions within Fujitsu, which allowed the first 21-inch Plasma TV product to be made. In 1993, I enjoyed a long multi-hour train ride with Dr. Shinoda between two distant cities in Japan. On that train ride he described to me how he and Fujitsu could make a 21-inch high-quality Plasma TV product. I was then able to go back to my company in the USA and start a color PDP development program in January of 1994. By the end of 1994 my company publicly demonstrated the high-quality 21-inch Plasma TV prototype shown in figure 24 in my PDP history paper cited above in question 2. Dr. Shinoda provided the spark that ignited the success of my small company in Plasma TVs and also the major companies such as Hitachi, Mitsubishi, Pioneer, NEC, Panasonic, Samsung and LG. Many billions of US dollars were subsequently spent on Plasma TV factories and Plasma TV became a common term in the world.

**4. Does proposed milestone represent a significant technical achievement?**

Yes, it was a major technical achievement to fulfill the long-standing dream of making a flat-panel, hang-on-the-wall TV and save the valuable space used by the bulky CRT. This was a success beyond our wildest dreams. It also solved the visual acuity problem of high-definition TV by allowing large-area displays to be made where the eye could easily resolve the high quality of the image on a small CRT TV.

**5. Were there similar or competing achievements? If so, have the proposers adequately described these and their relationship to the achievement being proposed?**

Yes, there certainly were important achievements by others as described in my above cited history paper, and yes, the proposal adequately describes and cites those achievements as references [2] and [5]. The achievement of Dr. George Dick of AT&T comes the closest. In the 70s and 80s both Dr. Dick and Dr. Shinoda were very actively studying the surface discharge PDP. They both made significant advances and they admired each other's work. In 1985 Dr. Dick published the three-electrode surface-discharge structure shown in figure 20 of my PDP history paper, and AT&T used the structure to manufacture the monochrome PDP products shown in figure 19 in 1986. These products did not have phosphors and so they were not color displays. AT&T terminated their PDP manufacturing in 1986, just a few months after they had announced this initial product. Dr. Dick did not have the opportunity to continue his research on PDPs. Dr. Shinoda continued to forge ahead, and he later developed the more practical structure shown in figure 23 which was ultimately used by all of the following Plasma TV manufacturers. The Address-Display-Separated gray scale method was not initially conceived or developed by anyone other than Dr. Shinoda.

**6. Have proposers shown a clear benefit to humanity?**

Yes, the development of the Plasma TV was a clear benefit to humanity. Plasma TVs demonstrated a number of very important benefits:

- A. They first demonstrated that very large-area flat-panel TVs can be practical products. After a few years the competing technologies of LCD TVs also had to develop large-area TVs, and ultimately OLED TVs also achieved large diagonals. Today most TVs sold in the world have large-diagonals.
- B. They first demonstrated existence of the huge world market for very-large flat-panel TVs.
- C. The wide viewing angles, high contrast ratios and the fast update rates of the Plasma TV were superior to the available LCD display competition.
- D. While Plasma TVs are no longer manufactured, their great impact still remains. The very high bar for image quality that Plasma TVs set for other technologies such as LCD TVs or OLED TVs in the areas of wide viewing angle, high contrast ratio, and fast update rates can still be seen in the TV show rooms of today.

The turning point for all of this large TV technological revolution was the commercial introduction of the 1993 Fujitsu 21-inch Plasma TV product that used the inventions of Dr. Tsutae Shinoda.

I would be happy to answer any other questions that the IEEE History Committee has.