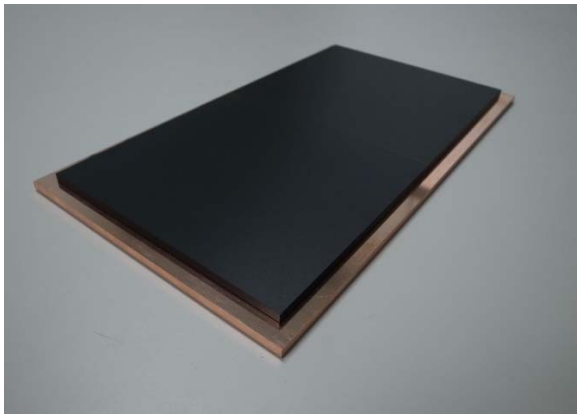
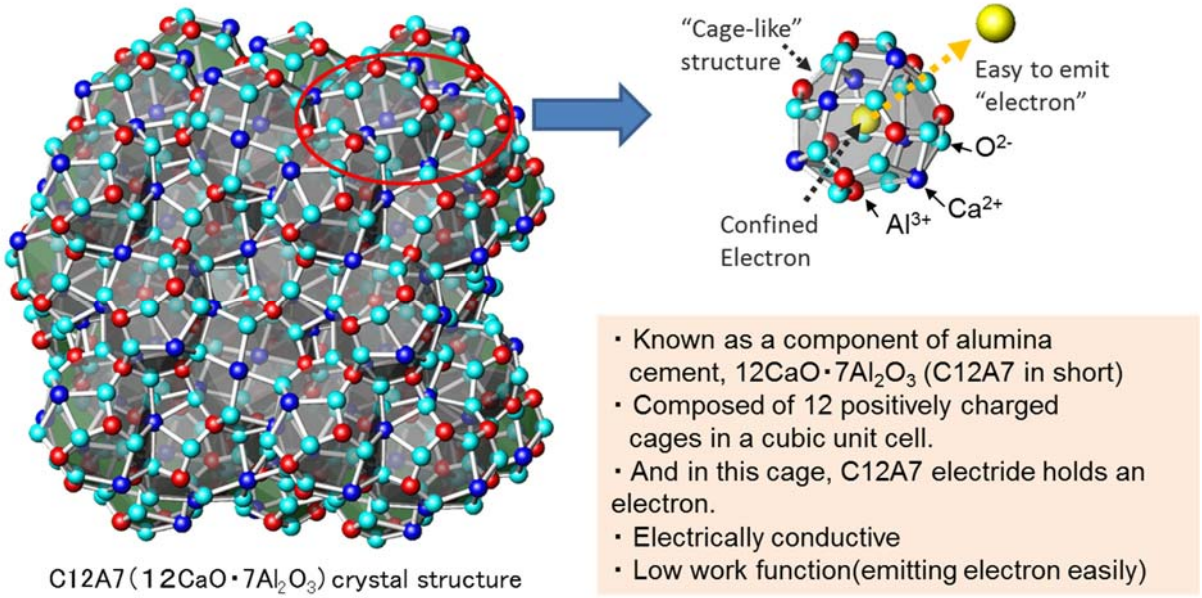
AGC Begins Mass-producing C12A7 Electride Sputtering Target Material

—Contributes to the efficient mass-production of large organic EL panels —

Tokyo, May 26, 2016—AGC Asahi Glass (AGC), a world-leading manufacturer of glass, chemicals and high-tech materials, has developed a uniform amorphous thin film using C12A7 Electride, which was developed by a study group of Professor Hideo Hosono at the Tokyo Institute of Technology, and has started industrialization and commercial production of a sputtering target material needed to mass-produce the thin film.



C12A7 is a component of alumina cement. It has a structure of interconnected cages (about 0.4 nm (Note 1) in inner diameter), which contain oxygen ions. By replacing all of the oxygen ions in the cages with electrons, the study group of Professor Hosono developed C12A7 Electride, which readily conducts an electric current like a metal, is stable chemically and thermally, and is easy to handle, while having the characteristic of readily emitting electrons. The study group also demonstrated that it can manufacture amorphous C12A7 Electride, which it found maintains the characteristics of C12A7 Electride.



C12A7（$12CaO \cdot 7Al_2O_3$) crystal structure

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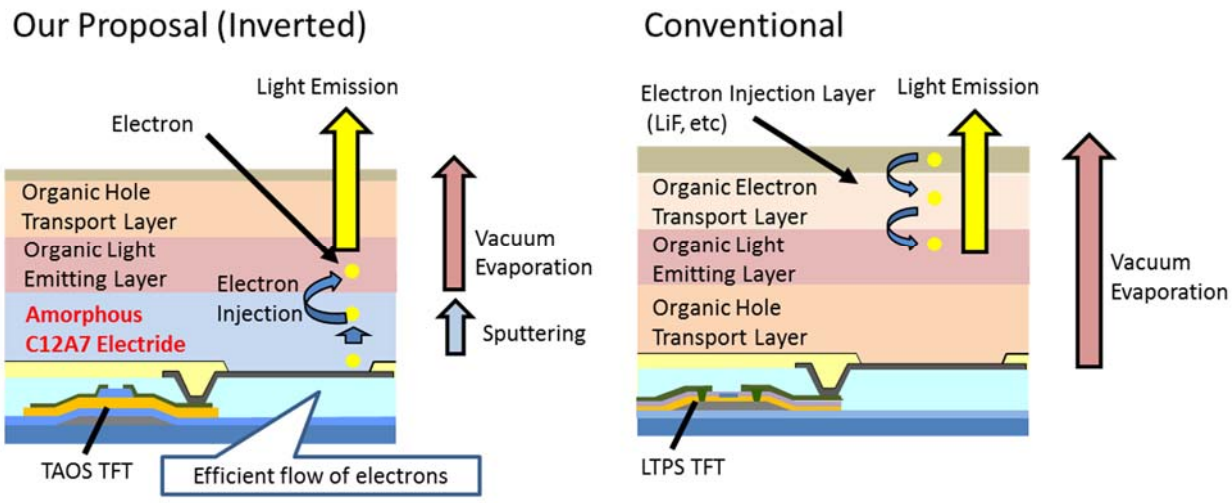
Currently, lithium fluoride (LiF) and alkali-doped organic materials are used as the electron injection material for an organic EL display. However, these materials are unstable and are used in an unstable state. Accordingly, the study group of Professor Hosono and the AGC Group developed the amorphous C12A7 Electride thin film, which is more stable. The amorphous C12A7 Electride thin film, which can be formed through a sputtering process (Note 2) at room temperature using the AGC Group-developed target material, has the following unique characteristics: it is transparent in the visible range; it can emit electrons as easily as metal lithium can; and it is chemically stable even in the atmosphere.

By combining this with an n-channel TFT element, which uses a transparent amorphous oxide semiconductor TAOS; (Note 3) developed by the study group of Professor Hosono, the low-driving-voltage electron transport layer can be manufactured stably and with high production yields even in the case of an inverted-structure organic EL display whose structure is advantageous for a device.

TAOS-TFT is suitable for driving a large organic EL panel, but there was no material that functions properly as an electron injection layer and an electron transport layer, which are necessary to realize an inverted structure that makes the best of the panel's performance. A series of these achievements is expected to substantially improve production of oxide TFT-driven organic EL panels.



Under its management policy, *AGC plus*, the AGC Group manufactures products that provide "new value and functions" for customers. The Group, as a pioneer of display materials, including glass substrates and cover glass, will promote technological innovations to offer new added-value products that satisfy its customers.

<Program Information>

A part of this achievement has been made in pursuing the following Research Theme of ACCEL

- ACCEL: Strategic Basic Research Program of Japan Science and Technology Agency (JST)
- Research Theme: "Materials Science and Industrial Application of Electride."(2013-2018)
- Research Director: Hideo Hosono (Tokyo Institute of Technology)
- Program Manager: Toshiharu Yokoyama
- Collaborating research institutes: AGC Asahi Glass

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<Reference Information>

About the AGC Group

AGC Asahi Glass (or also called AGC, Registered Company name: Asahi Glass Co., Ltd., Headquarters: Tokyo, President & CEO: Takuya Shimamura) is the parent company of the AGC Group, a world-leading glass solution provider and supplier of flat, automotive and display glass, chemicals, ceramics and other high-tech materials and components. Based on more than a century of technical innovation, the AGC Group has developed a wide range of cutting-edge products. The AGC Group employs some 50,000 people worldwide and generates annual sales of approximately 1.3 trillion Japanese yen through business in about 30 countries. For more information, please visit www.agc-group.com.

Note 1: nm: 1/1000 micron

Note 2: Sputtering process:

A metal that forms a thin film is installed in a vacuum chamber as a target, and rare gas elements (argon is usually used) and nitrogen (usually derived from air), both ionized by applying a high voltage, are made to collide with the target. Then, atoms on the target surface are ejected, reaching the substrate to form a film. Because the principle is simple and various sputtering devices are available, this method is used widely in various technical areas. Recently, the method has been used to manufacture thin films for semiconductors, LCDs, plasma displays, and optical discs, for which high-quality thin films are needed.

Note 3: TAOS:

TAOS stand for transparent amorphous oxide semiconductor. IGZO is one of TAOS's and composed of In-Ga-Zn-O.

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