Factor regulating the aging and rejuvenation of the brain

Discovery of an environmental factor for the activation of aged neural stem cells

We have discovered a factor that causes the impairment of neurogenesis in the aged brain. A mechanism has been identified by which stimuli including exercise re-activate the ability to generate newborn neurons that have declined due to aging. The discovery is expected to contribute to the prevention of diseases and the development of drugs and treatments, using a new target agent that controls neighborhood cells surrounding neural stem cells. We will further analyze the role of cells surrounding neural stem cells, which affect aging and various neurological disorders, to search for a new molecular marker detection method useful for diagnosis. We will develop industrial applications of the findings, including the development of drugs and new medical technology that promote the activation of stem cell-supporting cell populations without manipulating stem cells.

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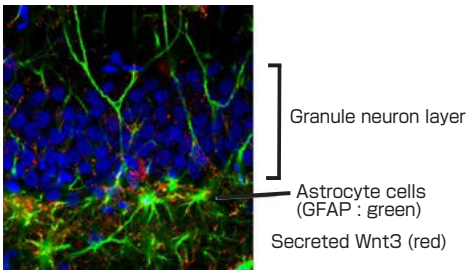
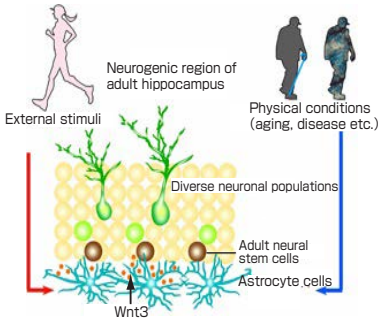


Wnt3 expression in adult hippocampus



The factor transmitting information on individuals to neural stem cells (Wnt3: orange)
The regulatory mechanism itself in neural stem cells responsible for the differentiation for the neuronal diversity remains unchanged, but the Wnt3 productivity of astrocytes is largely dependent on the condition of individuals.

Manufacturing technology for single-crystal thin films of organic semiconductors

Highest-performance printed thin-film transistors have been realized

We have developed a manufacturing technology for single-crystal thin films of organic semiconductors at arbitrary positions on the surface of sheets using a novel inkjet printing technique. The technique uses alternating print deposition of microliquid droplets both of ink composed of a dissolved organic semiconductor and of another ink that prompts crystallization of the organic semiconductor. The technology allows producing single-crystal thin films of an organic semiconductor, C_8-BTBT, with molecularly flat surfaces, and thereby improving performance of thin-film transistors (TFTs) that are indispensable building blocks for large-area electronics products such as flat displays. The performance of the device is 100 times as high as that of TFTs fabricated by conventional printing methods. It is expected that the technology would greatly accelerate the research and development of flexible electronic devices.

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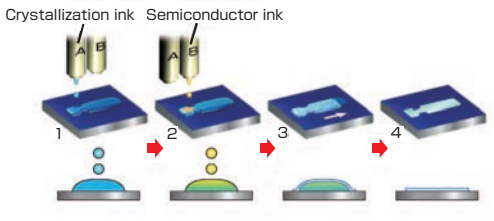
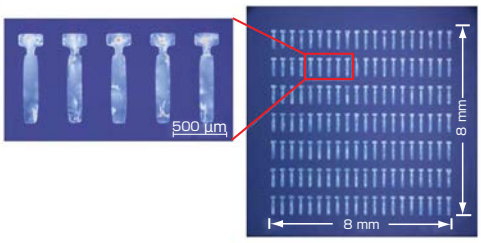


Schematic of semiconductor single-crystal thin film production by the double-shot inkjet printing technique



Single-crystal thin films of organic semiconductors formed at respective positions by a new inkjet printing technique