Stretchable and Foldable Electronics by Use of Printable Single-Crystal Silicon

안종현
성균관대학교 신소재공학부, 성균나노과학기술원

Stretchable and Foldable Electronics by Use of Printable Single-Crystal Silicon

Jong-Hyun Ahn
Sungkyunkwan Univ., SKKU Advanced Institute of Nanotechnology

Abstract : Realization of electronics with performance equal to established technologies that use rigid semiconductor wafers, but in lightweight, foldable and stretchable formats would enable many new application possibilities. Examples include wearable systems for personal health monitoring, 'smart' surgical gloves with integrated electronics and electronic eye type imagers that incorporate focal plane arrays on hemispherical substrates. Circuits that use organic or certain classes of inorganic electronic materials on plastic or steel foil substrates can provide some degree of mechanical flexibility, but they cannot be folded or stretched. Also, with few exceptions such systems offer only modest electrical performance. In this talk, I will present a new approach to high performance, flexible and stretchable integrated circuits. These systems combine single-crystal silicon nanoribbons with thin plastic or elastomeric substrates using both "top-down" and "transfer-printing" technologies. The strategies represent promising routes to high performance, flexible and stretchable optoelectronic devices that can incorporate established, high performance inorganic electronic materials.