Development of am energy-saving sintering process using microwave technology

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To realize energy saving in the ceramics industry, a microwave sintering process is studied and explored on following issues: 1) improvement of input energy efficiency by controlled microwave irradiation, 2) development of process to sinter at lower temperature and in a short time, and 3) mechanism of sintering during microwave irradiation.

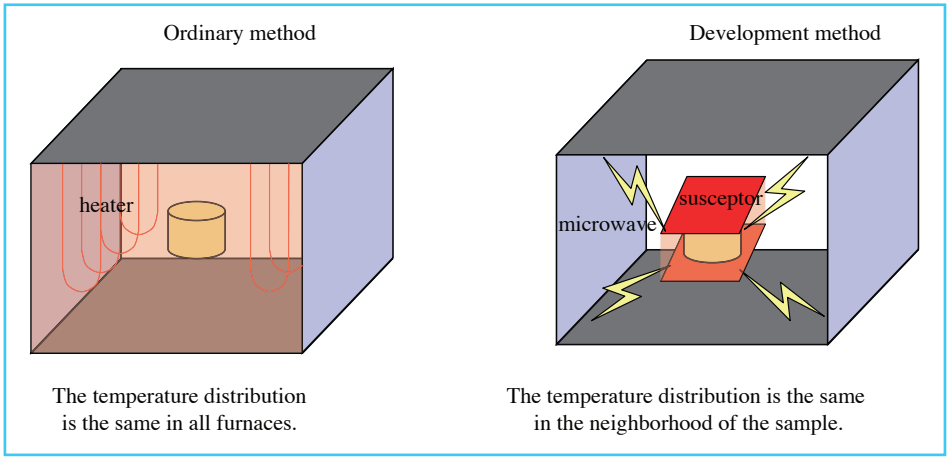

Figure: Illustration of new development sintering process.

Thin Films of Single-wall Carbon Nanotubes that Emit Polarized Light

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A success has been achieved in preparing thin films of isolated individual single-wall carbon nanotubes (SWNTs) that are aligned in a specific direction. By the isolation of tubes, these thin films retain the near-infrared photoluminescence inherent in semiconducting SWNTs, and, because of the tube alignment, exhibit strong optical anisotropy such as polarized absorption, polarized photoluminescence and birefringence. An achievement unprecedented in this fast-developing and competitive field, the present result must give great momentum to the elucidation and exploitation of optical and optoelectronic functions of carbon nanotubes. (Y. Kim, N. Minami, S. Kazaoui, Appl. Phys. Lett. **86**, 073103 (2005).)

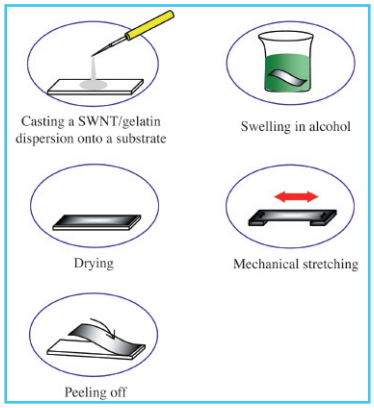

Fig 1: Gelatin-assisted preparation of carbon nanotube thin film and its alignment.

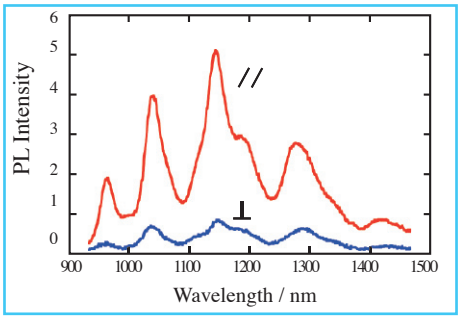

Fig 2: Thin film of isolated and aligned SWNTs generates photoluminescence (PL) strongly polarized in the alignment direction. Each PL peak corresponds to a bandgap optical transition in semiconducting SWNTs. If bundled, tubes would not emit light because of excitation quenching induced by inter-tube interactions.