



第39回 未来化学創造センター セミナー

Benefits of Class-II- Sol-Gel-Hybrids, ORMOCER®s, for industrial production focussing on electronic and photonic devices

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People of every age like to carry their private and business interconnection as well as data base and multimedia with them where ever they are. But they do not like to carry equipment as large as an attaché-case. Therefore, during the last decade electronic devices have been getting smaller and smaller causing a need for a higher integration level; i.e. μm -resolved packaging. The driving forces are mobile applications like cell-phones and toys or limited space in multi-media, sensing, automotive or safety devices. In addition, structures in micro-electronic as well as photonic components have to move more and more towards the nano-scale to fulfil the required specifications in cited handhelds as well as in servers and IT-interconnects to manage the exponential increase of data-streams.

Using hybrid materials, this implies controlling the inorganic-organic nano-structural units, while keeping in mind that most microelectronic applications cannot tolerate a highly prized material, respectively need low cost processing. On the one hand, e. g. low-k or high-k dielectric materials are searched for, but on the other hand being in dimensions less than 100 nm, the classical way of nano-particles in polymer matrices cannot be the choice. Reflecting the needs of nano-patterning technologies like two-photon-absorption based on femto-laser-writing or printing and nano-imprint-technology, the inorganic and organic units have to be chemically connected on a molecular scale. In addition, a better defined and reproducible build-up of nano-structured matrices based on nano building-blocks or clusters with reactive functions is being searched for.

The combination of standard characterization methods with computational visualisation leads to a focused optimization of in-situ silsesquioxane-mixtures produced at much lower costs. In addition to the general chemistry, examples for low cost production of ORMOCER® based devices in the field of microelectronic, polymer-electronic and photonic will be given.

2009/8/10 (月) 11時00分より
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