CONTENS

High temperature creep of oxide/oxide composites with single crystalline fibres obtained by the internal crystallysation method (ICM) are conducted for the first time. A systematic approach means that an analysis of the results is being performed by using microstructural creep models, which have been developed earlier. It is shown that while creeping at temperatures 1200 - 1400 °C composite specimens show evidence of two main mechanisms of deformation. The first mechanism is that with elastically deforming fibres, and second one is characterized by breaking fibres, which finally reach a stable length that corresponds to a constant creep rate. The most important conclusion from the present work is that the garnet based materials studied have the upper use temperature by about 100 °C higher than that of oxide/oxide composites reinforced with polycrystalline fibres. A further improvement of fabrication technology of the ICM-fibres and their composites will yield a further increase in the advantage mentioned up to at least 200 °C (p. 7-20; fig 13).

As high temperature structural materials silicon carbide ceramics offer many advantages including high melting point, low density, high elastic modulus and strength, good resistance to creep, oxidation and wear. Due to their outstanding thermo-mechanical properties, SiC is used as reinforcement as well as matrix in various high temperature composite materials. The present studies were undertaken to develop SiC solids, fibers as well as composites by CVR of respective solid carbon forms. Effect of temperature, reaction time and microstructure of carbon host materials on the conversion of carbon fibers to silicon carbide has been studied. The extent of conversion of SiC greatly depends on the nature of host carbon and its microstructure. Results show that percentage of C to SiC conversion increases with increase in temperature or reaction time. The degree of graphitization of the host carbon has also been found to increase the conversion. SiC fibers made from isotropic carbon fibers have no crack and percentage SiC conversion is better than that from PAN based carbon fibers. SiC conversion and whisker growth on the surface is found to be lower for isotropic C/C composite as compared to that on graphite. The cracks are generated due to tensile hoop strength due to the miss matching of coefficient of thermal expansions of two-phases, carbon and silicon carbide (p. 21-29; fig 9).

Technological schemes to fabricate composite materials containing carbon nanotubes and ceramic matrices have been developed. The first schem is based on hot pressing of a raw mixture of carbon nanotubes growthed in alumina powder volume and alumina powder. The second scheme is based on hot pressing of a mixture of carbon nanotubes and powders of niobium, tantalum or tungsten carbides. The hot pressing temperatures are 1400 – 1700 °C. Specimens obtained are intended for mechanical testing and measuring thermal and electrical conductivity. Microstructures of the carbon-nanotubes / ceramic-matrix composites have been studied. It is shown that the first scheme used to prepare the raw mixture yields a rather homogeneous distribution of carbon nanotubes in the material volume unlike the second one. The grains growth is observed but it is hampered in areas of nanotubes clasters (p. 30-39; fig 7).

The paper considers the features and potentials of the method for producing glass fiber reinforced polymers in a continuous process combined (i) spinning glass monofilaments from a glass-melting unit; (ii) impregnating the monofilaments with a binder; (iii) either formation of a glass veneer sheet or winding a final product. All these stages were widely described in open publications in the 50^{th} – 60^{th} of the last century, while continuous methods including that of winding directly after a furnace were not published. However all the methods were experimentally tested and showed an undeniable advantage of the materials produced by such methods over any analogues materials. The study of the «idealized» process enabled one to trace the effects of various factors in «pure» fabrication conditions. In particular, monofilament arise in a polymer without any damage and sizing agents, which complicates conditions of the fiber/matrix interaction. The author hopes that this experience can be useful in the development of new fabrication technologies of FRP (p. 47-64; fig 9).