DEVELOPMENT OF HYPER COAL DERIVED MESOPHASE PITCH BASED CARBON FIBER

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Mesophase pitch based carbon fiber (MPCF) with moderate tensile strength and Young's modulus was successfully developed using mesophase pitch (MP) derived from unique coal extracted raw material of Hyper Coal (HPC). We have tried to develop the novel preparation method of spinnable MP with very high yield of over 30 wt.% using relatively cheap raw material with usual heat treating method. HPC is a unique cheap coal extracted material which can be obtained by direct solvent extraction of coal using 1-methylnaphthalene as a solvent at 350 ~ 400°C under high pressure. HPC has very interesting characteristics of low ash, high carbonization yield and excellent thermos-plastic property.

For the preparation of spinnable MP, we first carried out mild hydrogenation of HPC for reducing high molecular weight fraction in HPC. After hydrogenation, we obtained spinnable MP with high yield (55%) by heat-treatment using nitrogen blown method after thin layer evaporation. CF was prepared through usual conditions of melt spinning, stabilization and carbonization using the HPC derived MP. Mechanical properties of CFs were evaluated in accordance with JIS R 7606. The tensile strength, elongation and Young's modulus of CF showed 1830 MPa, 1.37%, and 133 GPa, respectively.