

Title (en)  
FRICTION ELEMENT IN COMPOSITE CARBON/CARBON-SILICON CARBIDE MATERIAL AND METHOD FOR MANUFACTURING SAME

Title (de)  
REIBELEMENT AUS KOHLENSTOFF / KOHLENSTOFF-SILICIUMCARBID VERBUNDWERUSTOFF UND VERFAHREN ZU SEINER HERSTELLUNG

Title (fr)  
ELEMENT DE FRICTION EN MATERIAU COMPOSITE CARBONE/CARBONE-CARBURE DE SILICIUM ET PROCEDE POUR SA FABRICATION

Publication  
**EP 0956276 B8 20050316 (FR)**

Application  
**EP 97909404 A 19971014**

Priority

- EP 97909404 A 19971014
- EP 96402184 A 19961014
- FR 9701831 W 19971014

Abstract (en)  
[origin: EP0835853A1] The invention concerns a friction element produced in a composite material comprising a carbon fiber reinforcement and a matrix which, at least in the proximity of each or the friction surface, comprises: a first phase containing pyrocarbon obtained by chemical infiltration in vapour phase, in the proximity of the reinforcing fibers, a second carbon or ceramic refractory phase obtained at least partly by pyrolysis from a liquid precursor, and a silicon carbide phase obtained for example by siliconizing. Preferably, at least in the proximity of each or the friction surface, the composite material is constituted, in volume, of at least: 15 % to 35 % of carbon fibers, 10 % to 55 % of the first matrix phase containing pyrocarbon, 2 % to 30 % of the second matrix phase in refractory material, and 10 % to 35 % of silicon carbide. The invention is particularly useful for railway braking and for motor vehicles.

IPC 1-7  
**C04B 35/80; C04B 41/87; F16D 69/02**

IPC 8 full level  
**F16D 65/12** (2006.01); **B05D 5/06** (2006.01); **C04B 35/80** (2006.01); **C04B 41/52** (2006.01); **C04B 41/85** (2006.01); **C04B 41/87** (2006.01); **C04B 41/89** (2006.01); **F16D 69/00** (2006.01); **F16D 69/02** (2006.01)

CPC (source: EP KR US)  
**B05D 5/06** (2013.01 - KR); **C04B 35/521** (2013.01 - EP US); **C04B 35/573** (2013.01 - EP US); **C04B 35/6286** (2013.01 - EP); **C04B 35/62873** (2013.01 - EP); **C04B 35/62894** (2013.01 - EP); **C04B 35/62897** (2013.01 - EP); **C04B 35/80** (2013.01 - EP US); **C04B 41/009** (2013.01 - EP US); **C04B 41/52** (2013.01 - EP US); **C04B 41/89** (2013.01 - EP US); **F16D 69/023** (2013.01 - EP US); **C04B 2111/00362** (2013.01 - EP US); **C04B 2235/3826** (2013.01 - EP); **C04B 2235/48** (2013.01 - EP); **C04B 2235/5248** (2013.01 - EP); **C04B 2235/608** (2013.01 - EP); **C04B 2235/614** (2013.01 - EP); **C04B 2235/616** (2013.01 - EP); **C04B 2235/77** (2013.01 - EP); **C04B 2235/95** (2013.01 - EP); **Y10T 428/249924** (2015.04 - EP US)

C-Set (source: EP US)

EP

1. **C04B 41/52 + C04B 41/4531 + C04B 41/5001**
2. **C04B 41/52 + C04B 41/4535 + C04B 41/4554 + C04B 41/5001**
3. **C04B 41/52 + C04B 41/4535 + C04B 41/4554 + C04B 41/5059 + C04B 41/522**
4. **C04B 41/52 + C04B 41/4523 + C04B 41/4558 + C04B 41/5059**
5. **C04B 41/52 + C04B 41/4531 + C04B 41/5059 + C04B 41/522**
6. **C04B 41/009 + C04B 35/52**
7. **C04B 41/009 + C04B 35/806**

US

1. **C04B 41/52 + C04B 41/4531 + C04B 41/5001**
2. **C04B 41/52 + C04B 41/4535 + C04B 41/4554 + C04B 41/5001**
3. **C04B 41/52 + C04B 41/4535 + C04B 41/4554 + C04B 41/5059 + C04B 41/522**
4. **C04B 41/52 + C04B 41/4523 + C04B 41/4558 + C04B 41/5059**
5. **C04B 41/52 + C04B 41/4531 + C04B 41/5059 + C04B 41/522**
6. **C04B 41/009 + C04B 35/52**

Cited by  
CN107935617A; US8142845B2; WO2012016747A1; DE102010038914A1; WO2006004999A1; DE102007044783A1; EP2039666A2; EP1829843A2; US9663406B2

Designated contracting state (EPC)  
AT CH DE FR GB IT LI SE

DOCDB simple family (publication)  
**EP 0835853 A1 19980415**; AT E255545 T1 20031215; CA 2268516 A1 19980423; CA 2268516 C 20070403; CN 1128773 C 20031126; CN 1237950 A 19991208; DE 69726604 D1 20040115; DE 69726604 T2 20040930; DE 69726604 T3 20091210; EP 0956276 A1 19991117; EP 0956276 B1 20031203; EP 0956276 B2 20090527; EP 0956276 B8 20050316; HK 1023984 A1 20000929; JP 2001505863 A 20010508; KR 100512307 B1 20050905; KR 20000049126 A 20000725; RU 2201542 C2 20030327; UA 54452 C2 20030317; US 6221475 B1 20010424; WO 9816484 A1 19980423

DOCDB simple family (application)  
**EP 96402184 A 19961014**; AT 97909404 T 19971014; CA 2268516 A 19971014; CN 97199764 A 19971014; DE 69726604 T 19971014; EP 97909404 A 19971014; FR 9701831 W 19971014; HK 00103079 A 20000524; JP 51806998 A 19971014; KR 19997003211 A 19990413; RU 99109600 A 19971014; UA 99042046 A 19971014; US 28440299 A 19990413