

?? ? ? ? ? ? ? c e

1, 2, Bu 1

- 1. 518057;
- 2. 150001

Abstract: The body armor composites were fabricated by the mould pressing. The influences of resin type, fabric type and resin content on stab resistance of the composites were investigated. The results show that the stab resistance of Surlyn resin matrix composite is better than that of PU resin matrix composites. The stab resistance of Kevlar/Surlyn composite is better than that of UHMWPE/Surlyn composites. Kevlar/Surlyn composite with resin mass fraction of 47% has the best stab resistant performance.

Design and optimization of soft stab resistant armor composites

YAN Yiwu¹, CAO Hallin^{1,2}, ZHAO Jinhua¹

- 1. Shenzhen Key Laboratory of Composite Materials, Shenzhen Academic of Aerospace Technology, Shenzhen 518057, China;
- 2. School of Chemical Engineering and Technology, Harbin Institute of Technology, Harbin 150001, China

Abstract: The body armor composites were fabricated by the mould pressing. The influences of resin type, fabric type and resin content on stab resistance of the composites were investigated. The results show that the stab resistance of Surlyn resin matrix composite is better than that of PU resin matrix composites. The stab resistance of Kevlar/Surlyn composite is better than that of UHMWPE/Surlyn composites. Kevlar/Surlyn composite with resin mass fraction of 47% has the best stab resistant performance.

Keywords: aramid fabric Surlyn UHMWPE composites stab resistant property

2012-03-15 27-07-2012

DOI:

n(JSFZ01006300033A)

E-mail: caohl@hit.edu.cn

Email: caohl@hit.edu.cn

[1] [J]. 2004, 22(2): 5-8. Guo Jinghe, Jiang Yaming. The situation and development of the stab-resistant body armors [J]. Technical Textiles, 2004, 22(2): 5-8.

[2] [J]. 2012, 29(1): 54-61. Zhao Jinhua, Cao Hallin, Li Xia, et al. Effect of SiO₂ particle size on stab resistant properties of STF/Kevlar composites [J]. Acta Materiae Compositae Sinica, 2012, 29(1): 54-61.

[3] [J]. 2009, 38(7): 45-47. Fang Xinling, Liu Sheng, Zuo Xiangchun, et al. Effect of resin on stab-resistant properties of Kevlar materials [J]. Synthetic Fiber in China, 2009, 38(7): 45-47.

[4] [J]. 2008, 10(10): 15-18. Wang Zhigang, Zhou Lanying, Zhu Jie. Study of the SiO₂ nanoparticle/Kevlar fabric composites of stab-resistance [J]. Industrial Textiles, 2008(10): 15-18.

[5] [J]. 2008, 37(1): 5-9. Jiang Jianming, Li Guang, Jin Junhong, et al. The latest research developments of the super high performance PBO fiber [J]. Synthetic Fiber in China, 2008, 37(1): 5-9.

[6] [J]. 2008, 6-18. Shen Tunian. Multifunctional Kevlar reinforced thermoplastic resin shrapnel and bulletproof and stab-resistant armor thereof: China, CN2007101196729. 2008-6-18.

[7] Leroy C L, Laura G W, David V C. Soft armor composites: US Patent, 5354605. 1994-10-11.

[8] Jessie B, Mayo Jr, Eric D W, et al. Stab and puncture characterization of thermoplastic-impregnated aramid fabric[J]. International Journal of Impact Engineering, 2009, 36(9): 1095-1105.

[9] [J]. 2010, 19(5): 41-47. Wu Guangyu, Chen Bangwei. Stab-resistant garment and its development [J]. Synthetic Fiber in China, 2010, 19(5): 41-47.

[10] [J]. 2010, 19(5): 41-47. Wu Guangyu, Chen Bangwei. Stab-resistant garment and its development [J]. Synthetic Fiber in China, 2010, 19(5): 41-47.

[11] [J]. 2010, 19(5): 41-47. Wu Guangyu, Chen Bangwei. Stab-resistant garment and its development [J]. Synthetic Fiber in China, 2010, 19(5): 41-47.

[12] Keith M K, John E K, Young S L. Yarn pull-out as a mechanism for dissipation of ballistic impact energy in Kevlar KM-2 fabric [J]. Textile Research Journal, 2004, 74(11): 939-948.

[13] [J]. 2005, 28(12): 17-19. Xi Shiping, Cui Guide, Chen Nanliang. Tearing property study on the calendared flexible composites[J]. Technical Textiles, 2005, 28(12): 17-19.

[14] [S]. 2008. The professional police equipment standardization technical committee of ministry of public security. GA 68-2008 Stab resistance body armor for police [S]. Beijing: China BiaoZhun Publishing House, 2008.

1 C [J].

2 [J]. 2009, 26(4): 197-202

3 [J]. 2009, 26(4): 1-6

4 [J]. 2009, 26(3): 7-12

5 [J]. 2009, 26(4): 15-21

6 [J]. 2009, 26(4): 22-28

7 [J]. 2009, 26(4): 53-58

8 [J]. 2009, 26(4): 59-62

9 [J]. 2009, 26(4): 63-67

10 [J]. 2009, 26(4): 68-73

11 [J]. 2009, 26(4): 83-88

12 [J]. 2009, 26(4): 89-94

13 [J]. 2009, 26(4): 102-106

14 [J]. 2009, 26(4): 136-140

15 [J]. 2009, 26(4): 141-145

16 [J]. 2009, 26(4): 151-155

17 [J]. 2009, 26(4): 163-168

18 [J]. 2009, 26(4): 169-175

19 [J]. 2009, 26(4): 176-180

20 [J]. 2009, 26(4): 181-185

21 [J]. 2009, 26(3): 13-17

22 [J]. 2009, 26(3): 18-23

23 [J]. 2009, 26(3): 24-28

24 [J]. 2009, 26(3): 35-39

25 [J]. 2009, 26(3): 99-104

26 [J]. 2009, 26(2): 1-5

27 [J]. 2009, 26(2): 6-10

28 [J]. 2009, 26(2): 18-24

29 [J]. 2009, 26(2): 37-40

30 [J]. 2009, 26(3): 105-110

31 [J]. 2009, 26(3): 133-137

32 [J]. 2009, 26(3): 133-137

Supporting Info

PDF(1354KB)

[HTML]

[PDF]

Supporting Info

Email Alert

Supporting Info

Surlyn

UHMWPE

Article by YAN

Article by CAC

Article by ZHAO

602 c a , 2002,19(4): 46-50 TIB₂ λ O j [J]. c a , 2002,19(5): 66-70
603 c a , 2002,19(4): 51-55 SiCp/6151Al c e E, c a , 2002,19(5): 40[J].
604 2002,19(6): 87-91 抄? L? o [J]. c a ,
605 605 , y . ó?? c e p tó [J]. c a , 2002,19(4): 69-75
606 .CPP/PLLA? ? ? ? ? ? ? ? ? ? c j o [J]. c a , 2002,19(6):
97-100
607 p , . á y 40[J]. c a , 2002,19(5): 84-89
608 , , 3 . c c x j [J]. c a , 2002,19(4): 76-80
609 , , , , , . á? ? ? ? á/ c e L O y [J].
c a , 2002,19(6): 101-105
610 , , , , . c 0 [J]. c a , 2002,19(5): 90-94
611 o , P, ,? ? ? . QY8911-? ? ? ? ? ? ? ? ? ? y [J]. c a , 2002,19(6): 106-110
612 , . c c M p á O [J]. c a , 2002,19(4): 86-91
613 抄 [J]. c a , 2002,19(5): 95-101
614 T , . á? ? ? ? ? ? ? ? ? ? c p 抄 [J]. c a , 2002,19(4):
92-95 照? ? ? ? ? ? [J]. c a ,
615 .Sn-Pb ? ? ? ? 维 c e PTC40[J]. c a , 2002,19(6): 116-119
616 , C0, C . c c x ? ? ? ? oy oy o [J]. c a , 2002,19(5): 108-
113
617 „HAC/PVAMDFo[J]. c a , 2002,19(4): 96-100
618 , . l? á (e-) c e k? ? o [J].
c a , 2002,19(4): 101-105
619 in , . FRP? ? oy [J]. c a , 2002,19(6): 125-129
620 , , , . c c t [J]. c a , 2002,19(5): 118-124
621 , , , , . / á á c e y [J]. c a ,
2002,19(6): 130-133
622 , , , . WC/? - c x 照 y 40 [J]. c a , 2002,19(2):
41-44
623 [J]. c a , 2002,19(2): 1-12
624 , . ? á c p h? ? ? ? ? ? o [J].
c a , 2002,19(2): 24-27
625 , . 抄 ? ? ? á/ c e k. [J]. c a , 2002,19(3): 37-41
626 , , , . RTM? ? ? ? ? ? ? ? ? ? ? ? . [J]. c a , 2002,19(2): 18-23
627 抄, , . c j [J]. c a , 2002,19(3):
21-28
628 , , , . á e [J]. c a , 2002,19(3): 120-
123
629 , , , . ? .LTM? ? ? 临 c e o [J]. c a , 2002,19(2): 28-32
630 抄, , . SIC c / b [J].
c a , 2002,19(3): 56-60
631 , , , . „Al-TiO₂e XD j [J]. c a , 2002,19(1): 28-31
632 , , , . ? ? ? ? ? ? ? c [J]. c a , 2002,19(3): 16-20
633 抄 , , , . ? á c [J].
c a , 2002,19(3): 51-55
634 , , . PP/mPE/SGF c e k? ? a [J]. c a , 2002,19(3): 33-36
635 , , , . ? / ? c e l [J]. c a , 2002,19(3): 66-69
636 , , , . á? ? ? [J]. c a , 2002,19(2): 71-74
637 , , , . 抄, , , , T, . ? ? l? ? ? ? ? ? c [J].
c a , 2001,18(4): 1-5
638 , , , . c e a t [J]. c a , 2001,18(1): 1-6
639 , , , . 抄 RTM á 照 o [J]. c a , 2001,18(4):
17-22
640 , , , . SIC MoSi₂ c [J]. c a , 2002,19(1): 59-63
641 ? , , , . c c x á? - a [J]. c a , 2002,19(3): 75-82
642 , , , . c p ? ? . áO [J]. c a , 2002,19(1): 113-116
643 2002,19(1): 117-121 C . ? ? ? ? ? ? /á ? c e o [J]. c a ,
644 122-125 , , , . c á λ e o [J]. c a , 2002,19(1):
645 2002,19(2): 80-84 c b o [J]. c a ,
646 , , , . á c e e [J]. c a , 2002,19(3): 124-126
647 C , , , . SMA á b 维 c e a [J]. c a , 2002,19(2): 89-
93
648 C , , , . PZN-PZToy 抄 PVDFoy 维 c e [J]. c a , 2002,19(3): 70-74
649 , , , . ? 维 [J]. c a , 2002,19(3): 88-93
650 , , , . á .? ? 抄? c e O [J]. c a , 2002,19(2): 99-102
651 , , , . O . c L é [J]. c a , 2002,19(1): 85-89
652 , , , . 抄? ? ? ? ? ? ? ? ? ? ? ? 抄 / ? c M / ? c e I y [J].
c a , 2002,19(2): 103-107
653 , , , . ? ? ? ? | c e [J]. c a , 2002,19(1): 90-94
654 , , , . c e ? [J]. c a , 2001,18(3): 1-4
655 Cs , , , . T . c á á? ? o [J]. c a , 2001,18(4): 11-16
656 , , , . ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? c e o [J]. c a ,
2001,18(3): 5-9
657 , , , . c [J]. c a , 2001,18(1): 7-11
658 , , , . /LLDPE c a ? ? ? o [J]. c a , 2001,18(4): 23-28
659 , , , . EPON862? ? ? ? ? ? ? ? ? ? e a o [J]. c a ,
2001,18(1): 16-19
660 x , , , . Cao Wen-wu. á c e [J].
c a , 2001,18(1): 20-24
661 ? , , , . c y ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? á? / [J].
c a , 2001,18(4): 34-37
662 , , , . h , , , . e [J]. c a , 2001,18(3): 22-25
663 抄 , , , . ? ? ? , e , , , , ? , n .BMI? ? ? a RTM u o [J].
c a , 2001,18(3): 30-33
664 , , , . 抄 c e e o [J]. c a , 2001,18(1): 34
665 -37 , , , . RFI k ? ? ? ? ? ? ? ? o [J]. c a , 2001,18(1): 38-41
666 , , , . 抄, u . Ti 照 ? p Bi c Ti/CFRP y [J]. c a , 2001,18(3): 26-29
667 , , , . SICc y [J]. c a , 2001,18(4): 42-45
668 , , , . Ti-40Al-2B ? ? ? ? ? TiB₂ [J]. c a , 2001,18(4): 46-
49
669 , , , . C . , 抄 维 c PTC40 y [J]. c a , 2001,18(3):
34-37
670 , , , . u , , , . c p o [J].
c a , 2001,18(1): 46-49
671 抄 , n , , , . SIC c ? ? ? ? ? ? ? o [J]. c a , 2001,18(1): 62-66
672 , , , . A, .Ti-Al-B TIB [J]. c a , 2001,18(4): 50-
53
673 , , , . k .? á(CF)? ? ? ? ? ? o (PMR-15) c ? ? ? ? ? ? y [J]. c a ,
2001,18(1): 50-54
674 A , , , . 抄 - c e o [J]. c a , 2001,18(1): 55-57
675 (1): 58-61 , , , . c p M y [J]. c a , 2001,18
676 2001,18(1): 67-70
677 , , , . 抄
678 ? u, u, . á c e [J]. c a , 2001,18(4): 64-67
679 , , , . 抄 Al-Si c ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? y [J]. c a ,
2001,18(1): 76-78
680 , , , . 抄 , u 抄 .C/SIC á O o [J]. c a , 2001,18(4): 68-71
681 , , , . SiO₂-AlN c e a ? ? ? [J]. c a , 2001,18(1): 83-88
682 B, ? , , . c e I 抄 [J]. c a ,
2001,18(4): 76-81
683 , , , . ? ? ? ? ? ? ? ? c e u [J]. c a , 2001,18(1):
89-92
684 , , , . n / p O t [J]. c a , 2001,18(4): 82-86

2006,23(4): 175-179
1012 , n.CFRP w RC 4O [J]. c A , 2006,23
(3): 158-164
1013 P, , e . á ? ? ? p tó [J]. c A , 2006,23(3):
165-169
1014 , ú, .?? ?? | c M A o [J]. c A , 2006,23(3): 170-175
1015 Cs, 4 , .J? c d " Ó 伯 Y o [J].
c A , 2006,23(4): 169-174
1016 .SIC
1017 [J]. c A , 2006,23(3): 146-152
1018 . á ? ? ? c " bL? ?? 艦 [J]. c A , 2006,23(3):
153-157
1019 .SiCp/ 6061Al ? c e TH I [J]. c A ,
176-180
2006,23(2): 1-8
1020 , ? . λ o c e o " z [J]. c A ,
2006,23(1): 1-11
1021 y . ?? ? , oy η b ? c c ? " Y [J].
c A , 2006,23(1): 12-16
1022 , á . c A ? ? ? á
[J]. c A , 2006,23(2): 14-20
1023 , 4 , c , , 獵 . Cu/ Al₂O₃
c [J]. c A , 2006,23(2): 21-24
1024 ? " ? ? . á o ? " ± o [J]. c A ,
2006,23(1): 31-36
1025 .? ? ? ? [J]. c A , 2006,23(1): 37-43
1026 Cs ,JHMPWE á 酒 ? 臨 c [J]. c A ,
2006,23(2): 30-35
1027 , k , . ? ? ? ? MPN I c M [J]. c A ,
2006,23(2): 36-41
1028 , . ? ? ? b Y [J]. c A ,
2006,23(2): 25-29
1029 , . ? á t? ? ? ? c A ? ? ? [J].
c A , 2006,23(1): 51-55
1030 . á ? ? ? c A ? ? ? [J]. c A , 2006,23(2): 59-64
1031 + . / \ c e SEM o [J]. c A ,
2006,23(1): 75-79
1032 , v . n / ? c e [J]. c A ,
2006,23(2): 77-81
1033 , e , ? ? /
1034 ? a , . b [J]. c A , 2006,23(1): 80-84
2006,23(2): 82-87
1035 , . ? ? ? ? ? ? / ? ? ? 3D ? ? ? c ? ? ? ? ? ? ? ? Y [J].
c A , 2006,23(1): 85-91
1036 游, NORUZIAAN Bahman, LEE Stephen, CHANG Moe, u . C c
[J]. c A , 2006,23(2): 93-98
1037 , ? , . ÷ M SiCp/ Al [J].
c A , 2006,23(1): 92-98
1038 ? ? ? , v , ½ , Al(Cr)₂O₃2Cr(Mo) ú c e ? ? ? ? ? ? ? ? [J]. c A ,
2006,23(2): 104-109
1039 , . c 游 [J]. c A , 2006,23(2): 169-
174
1040 . á ? ? ? ? ? b v [J]. c A , 2006,23(1): 135-141
1041 , ? á c 3 4 7 [J]. c A , 2006,23
(2): 123-127
1042 . ? - [J].
c e [J]. c A , 2006,23(2): 115-122
1043 . c M , . ? ? ? ? ? ? ? ? ? [J].
c A , 2006,23(1): 142-146
1044 , o . ? ? ? , c c x 2 [J]. c A , 2006,23(
1): 154-160
1045 . C c ? ? ¶ á [J].
c A , 2006,23(2): 175-179
1046 c c x ? ? ? ? ? [J]. c A , 2006,23(2):
180-184
1047 ½ , ? h , o . ½ , ? h , o [J]. c A , 2006,23(1): 173-179
1048 á ? c e [J]. c A ,
1999,16(2): 73-76
1049 , / , ? ? , á ? ? ? ? ? ? ? ? c 3 ? ? ? ? [J]. c A ,
2006,23(1): 26-30
1050 n á e , c oy oy ¶ [J].
c A , 1999,16(1): 81-86
1051 [J]. c A , 2010,27(5): 1-6
1052 ? h , . c e [J].
c A , 2010,27(5): 7-12
1053 y [J]. c A , 2010,27(5): 13-18
1054 , ? , á , n , θ c , [J]. c A , 2010,27(5): 19-23
1055 , ? ? 游 / \ 2 c [J].
c A , 2010,27(5): 29-35
1056 ? , . ? á c [J].
c A , 2010,27(5): 36-40
1057 ¶ ? ? ? ? ? á q , á , ? o [J]. c A , 2010,27(5): 41-46
1058 , Y .C/C-SiC? ? ? c j A ? ? ? Y [J].
c A , 2010,27(5): 93-100
1059 o c e kb ? ? ? ? ? ? ? ? [J].
c A , 2010,27(5): 101-107
1060 , . á [J]. c A , 2010,27(5):
79-85
1061 , . J , ? c [J]. c A , 2010,27(5):
86-92
1062 , , , , c 4 ? ? ? ? ? ? ? ? [J]. c A , 2010,27(5): 108
-115
1063 á , . á c oy [J].
c A , 2010,27(5): 116-121
1064 , ? , ? ú.P ? ? ? ? ? c e [J]. c A , 2010,27(5): 122-128
1065 , w , á ? ? ? ? ? c [J]. c A ,
2010,27(5): 129-135
1066 , .Cu-FeS c e ? ? ? ? ? o [J]. c A ,
2010,27(5): 136-141
1067 " , 4 á , e , . c oy ? [J]. c A ,
2010,27(5): 142-149
1068 " , 4 á , e , . c oy 4 [J]. c A ,
2010,27(5): 150-155
1069 , , . ? á / c e [J]. c A , 2007,24(3): 1-6
1070 , . ? ? ? ? [J]. c A , 2005,22(4): 1-5
1071 Cs . á 酒 ? ? ? ? ? c
[J]. c A , 2007,24(3): 7-12
1072 C , . : 臨 c t
e [J]. c A , 2007,24(3): 13-17
1073 P á ? ? ? ? ? c , A ? ? ? ? [J]. c A , 2007,24(3): 18-22
1074 , eo, . ? ? ? ? ? c 8 mm e [J].
c A , 2007,24(3): 23-27
1075 , . 4 T RTM [J].
c A , 2005,22(4): 23-29
1076 wh , o + . á c e [J].
c A , 2007,24(3): 28-34
1077 , . ? á c e oy L [J]. c A , 2005,22
(4): 40-46
1078 n , . ? ? ? ? ? CVI C/
c c ? [J]. c A , 2005,22(4): 47-52
1079 , ? , . ú , . ? , . ? ? ? ? ? O Y [J].
c A , 2005,22(4): 58-67
1080 , . GF/ PP ? ? ? ? ? ? ? | c M w Y [J].
c A , 2007,24(3): 52-58
1081 .SiCp/ Ni ? c e [J]. c A , 2005,22(4): 68-74
1082 , ? , . 游 ZrO₂(f) / PMMA
PMac Y [J]. c A , 2007,24(3): 59-62
1083 , , A s , . / / PVC c
[J]. c A , 2007,24(3): 63-71
1084 ? . 2D-C/ SiC c e oy d 4 g ' [J]. c A ,
2005,22(4): 81-85

