

NIPTA2010英日化学問題最終解答

1. ポリウレタンポリウレア複合体(USP7, 687, 147) 214 words

<p>1. A composite article providing blast mitigation, the composite article comprising:</p> <p>a fixed structure including a substrate, the fixed structure being subject to blast exposure, the fixed structure being selected from the group consisting of walls, floors, roofs, exterior ceilings, interior ceilings, dikes, dams, reservoirs, containment walls, Jersey barriers, barricades, bunkers, bridges, roadways, aqueducts, flumes, beams, columns, and piers; and</p> <p>a polyurethane-polyurea layer bonded to the surface of the substrate and oriented in a direction of anticipated blast exposure to provide blast and fragment protection,</p> <p>the polyurethane-polyurea layer including a reaction product of (a) an isocyanate component comprising a toluene diisocyanate prepolymer having from 50% to 90% of a toluene diisocyanate, by weight of the toluene diisocyanate prepolymer, and a polyol having a functionality from 2 to 3 and being selected such that the toluene diisocyanate prepolymer has an NCO group content from 2.5% to 12%, and (b) an</p>	<p>爆風軽減のための複合物品であって、該複合物品が、</p> <p>基材を含む固定構造体であって、爆風に暴露され、壁、床、屋根、外部天井、内部天井、土手、堰、貯蔵体、封じ込め壁、ジャージー障壁、バリケード、バンカー、橋、車道、水道、水路、梁、支柱および栈橋からなる群から選択される固定構造体と、</p> <p>前記基材の表面に接合され、かつ予想される爆風曝露の方角に向いていて、爆風および破片に対する保護体となるポリウレタン-ポリ尿素層とを含み、</p> <p>前記ポリウレタン-ポリ尿素層が、トルエンジイソシアネートプレポリマーの重量で50%から90%までのトルエンジイソシアネートを有するトルエンジイソシアネートプレポリマーおよび、2から3の官能性を有し、かつトルエンジイソシアネートプレポリマーが2.5%から12%までのNCO基含有量を有するように選択された多価アルコールを含むイソシアネート成分 (a) およびイソシアネートと反応しうる成分 (b) との反応生成物を含み、</p>
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<p>isocyanate-reactive component,  the reaction product being the result of impingement mixing by plural component spray equipment using pressures between 2,000 psi and 3,000 psi and temperatures in the range of 145°F. to 190°F.,  the polyurethane-polyurea having the following characteristics: a gel time between 5 and 9 seconds, a tack-free time between 10 and 16 seconds, and a tensile strength between 4,109 psi and 4,295 psi.</p>	<p>前記反応生成物が、約2,000 psi および約3,000 psi の間の圧力および華氏約145度から華氏190度までの範囲の温度を用いて、複数成分のスプレー装置による衝突混合で得られ、  前記ポリウレタン-ポリ尿素が、5から9秒の間のゲル化時間、10から16秒の間のタックフリータイム、および4,109 psi から4,295 psi の間の引張強さ、の特性を有している、複合物品。</p>
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参考部分

TECHNICAL FIELD OF THE INVENTION

This invention relates, in general, to mitigation measures for explosive blast threats and, in particular, to a composite article having a substrate and a polyurethane-polyurea layer disposed thereon to provide blast and fragment protection from explosive devices.

BACKGROUND OF THE INVENTION

Mitigation measures for explosive blast threats are applicable to combat theater operations, potential civilian terrorist targets, and potential sites of accidental explosions. Accordingly, blast mitigation measures are being utilized in military, government, business, and industrial applications to avoid casualties, reduce damage to infrastructure, and remain operational in the event of an explosion.

Existing mitigation measures for explosive threats include maximizing the stand-off distance between the target and potential explosives and hardening the target's envelope. However, often it is not possible to maximize the stand-off distance. This is particularly true with respect to military applications, such as combat vehicles, and civil applications, such as buildings in urban settings. Hence, there is a need for mitigation measures that harden a potential target's envelope and a greater need for such measures in instances where it is not possible to maximize the stand-off distance.

### Example I

An A-side formulation is made by reacting 60% by weight of the A-side formulation of AIR PRODUCTS.RTM. TDI-based prepolymer, 23% by weight of the A-side formulation of MONDUR.RTM. ML MDI isomer mixture, and 17% by weight of the A-side formulation of PPG-4000 prepolyol. The ingredients are mixed vigorously at a speed that is short of forming a vortex. A B-side resin is formed by mixing 70% by weight of the B-side formulation of JEFFAMINE.RTM. D-2000 polyoxypropylenediamine, 20% by weight of the B-side formulation of ETHACURE.RTM. 100 curing agent, 7% by weight of the B-side formulation of JEFFAMINE.RTM. D-230 epoxy curing agent, and 3% by weight of the B-side formulation of JEFFAMINE.RTM. T-5000 polyol. The ingredients are stirred at ambient conditions until well mixed. Optionally, a tertiary type amine catalyst may be utilized to increase the rate of the reaction. The B-side resin is then complete.

The A-Side and the B-side are then processed through a GX-7 spray gun, which is manufactured by Gusmer Corporation (Lakewood, N.J.), and impinged into each other at a 1:1 ratio at 2500 psi and 170.degree. F. (77.degree. C.). The resulting polymer gels in approximately 10 seconds and is tack free in approximately 12 seconds.

### 問題2 燃料電池材料(WO2010059184) (175 words)

<p>[0001] Another problem is caused by the heat loss due to vaporization of the fuel acting to cool an area to a temperature that is lower than the membrane and catalyst layers. If the cooling is sufficient, then water generated by the fuel cell reaction at the MEA temperature may have a dew point that is higher than the temperature of the evaporation area of the fuel cell. This can result in condensation of water at the evaporator surface in the anode chamber, thus leading to the</p>	<p>ある領域を膜および触媒層よりも低い温度に冷却すべく作用する燃料の蒸発による熱損失で別の問題が起こる。冷却が十分だとMEA温度で燃料電池反応により生成する水は燃料電池の蒸発領域の温度よりも高い露点を持つかもしれない。その結果、陰極室内の蒸発器表面で水の凝縮が起こり、先に述べた陰極の活性領域における水の蓄積に関する問題が発生することになる。</p>
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<p>problems discussed above regarding build up of water in the active area of the anode.</p>	
<p>[0002] Furthermore, an uneven distribution of fuel to the active area of the fuel cell, can lead to "hot spots," which are locations on the membrane that have a much higher concentration of fuel than other places on the membrane. These "hot spots" result in uneven reactions at the catalyst face, degradation of the membrane due to high temperatures, and uneven generation of water which can shut down the electrochemical reaction at the localized area.</p>	<p>さらに、燃料電池の活性領域への燃料分配が不均一ために、「ホットスポット」と呼ばれる、膜に燃料の濃度が膜の他の場所よりもずっと高い場所が発生する。これらの「ホットスポット」は触媒面における不均一な反応の原因となり、温度上昇による膜の劣化を招き、水が不均一に生成して局所的に電気化学反応を停止する。</p>

問題3 超硬合金(WO2009111749) 214 words

<p>[0003] In one embodiment of the present invention, the cemented carbide body is a cemented carbide cutting tool insert with a 10- 25 <math>\mu</math>m, preferably 15-20 <math>\mu</math>m, thick binder phase enriched surface zone, essentially free from cubic carbide or carbonitride phases. The surface zone has an average binder phase content 1.3-2.5 times higher than that of the inner portion of the insert.</p>	<p>本発明の一実施形態において、超硬合金体は、本質的に立方晶系炭化物または炭窒化物を含まない10～25 <math>\mu</math>m、好ましくは15～20 <math>\mu</math>m厚みの結合相を富化した表面域を有する超硬合金切削工具インサートである。インサート表面域における平均結合相含有率は内側におけるよりも1.3倍～2.5倍高い。</p>
<p>[0004] The thickness and binder phase content of the surface zone is measured at a distance about 0.5 mm from the edge line on the</p>	<p>表面域の厚みと結合相含有率は超硬合金インサートのすくい面の稜線から約0.5 mmの距離で測定される。また、</p>

<p>cemented carbide insert rake face. In addition, compared to cemented carbide inserts according to prior art, the structure contains less small WC-grains, the size of the gamma phase is increased and the gradient zone contains relatively large Co binder phase islands.</p> <p>[0005] The average size of the Co binder phase islands in the binder phase enriched surface zone in cemented carbide inserts made according to the invention is 0.7-1.0 <math>\mu\text{m}</math>, the maximum size is 3-4 <math>\mu\text{m}</math>, measured on polished and Nital etched cemented carbide inserts in an optical microscope at a magnification of 1500x.</p> <p>Etching time is 15 minutes in a Nital etching reagent consisting of 10% solution of HCl in methanol. The hardness within the central parts of the cemented carbide insert, shall be &gt;1500 HV3, preferably 1500-1700 HV3.</p>	<p>従来技術による超硬合金インサートに比べると、本構造体に含まれる小WC粒子の数は少なく、<math>\gamma</math>相のサイズはより大きく、組成が変わる領域には比較的大きなCo結合相の島が含まれる。</p> <p>本発明に従って製造された超硬合金インサート中の結合相富化表面域におけるCo結合相の島の平均サイズは、研磨およびナイタル・エッチング後の超硬合金インサートを1500倍の光学顕微鏡で観察したところ、0.7~1.0 <math>\mu\text{m}</math>で、最大サイズは3~4 <math>\mu\text{m}</math>である。</p> <p>エッチング時間は10%HC1を含むメタノール溶液からなるナイタル・エッチング剤中で15分である。超硬合金の中心部のHV3硬度（ピッカース3硬度）は1500より高くなければならず、好ましくは1500~1700である。</p>
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total 603 words