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54 **Tungsten duplex composite electrode and filament material.**

57 The present invention provides a tungsten-based duplex composite member, e.g., wire or rod, which combines the emissive, nonsag, or other desirable qualities of an inner tungsten-based core material with a different combination of properties, for example, resistance to attack, by the presence of a different tungsten-based material as an outer sheath or shell surrounding the core material.

In one embodiment of the present invention, an electrode is formed from a duplex composite member, composed of a thoriated tungsten core (W - ThO₂) and a thin rhenium (Re) shell.

Other embodiments of duplex composite members are provided by thoriated tungsten discharge electrodes in which it is desirable to have two different concentrations of thorium (ThO₂) in the element, a first concentration in the core of the duplex composite member and a second concentration in the shell or surface of the member.

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	PATENT ABSTRACTS OF JAPAN vol. 5, no. 59 (E-53) 22 April 1981, & JP-A-56 11832 (TOSHIBA) 5 February 1981, * the whole document *	1, 18, 20	H01J61/073 H01J61/067 H01K1/08
Y		2-5, 15, 16, 19, 21, 23-25	
A		6	
X	FR-A-1464066 (CLAUDE PAZ ET VISSEAUX) * page 1, column 2, paragraphs 2 - 4 * * page 1, column 2, paragraph 7 *	1, 2, 6, 9, 18	
Y		3-5, 15, 16, 19-21, 23-25	
A		12, 14	
X	PATENT ABSTRACTS OF JAPAN vol. 2, no. 64 (E-33) 17 May 1978, & JP-A-53 30266 (TOSHIBA) 22 March 1978, * the whole document *	1, 6, 18	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
Y		2-5, 15, 16, 19-21, 23-25	H01J H01K
A		13	
X	PATENT ABSTRACTS OF JAPAN vol. 8, no. 258 (M-340) 27 November 1984, & JP-A-59 130697 (IWASAKI DENKI KK) 27 July 1984, * the whole document * * Derwent abstract*	1, 20	
Y		2-5, 15, 16, 19, 21, 23-25	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 JUNE 1990	Examiner MARTIN Y VICENTE M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	FR-A-1234443 (PHILIPS) * page 1, right-hand column, lines 17 - 33 * * page 2, left-hand column, lines 15 - 18 *	1, 15	
A	---	16, 23	
Y	EP-A-19992 (EMI-VARIAN LTD) * abstract * * page 6, line 8 * * page 7, lines 28 - 29 *	1, 19-21, 24	
Y	PATENT ABSTRACTS OF JAPAN vol. 6, no. 91 (E-109)(969) 28 May 1982, & JP-A-57 25664 (MITSUBISHI DENKI K.K.) 10 February 1982, * the whole document *	2-5	
Y	DE-A-3036746 (TOKYO SHIBAURA DENKI K.K.) * page 4, paragraphs 3 - 4 * * page 12, lines 18 - 20 *	15, 16, 23	
D, Y	GB-A-2079531 (PHILIPS) * abstract * * page 1, lines 76 - 99; claims 1, 2 *	24, 25	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 JUNE 1990	Examiner MARTIN Y VICENTE M.
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