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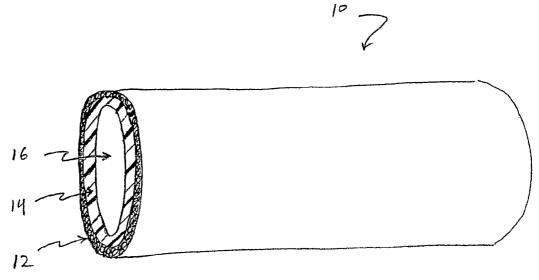
10/918,853	13 August 2004 (13.08.2004)	US
60/602,542	18 August 2004 (18.08.2004)	US
60/613,165	24 September 2004 (24.09.2004)	US
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[Continued on next page]

(54) Title: MEDICAL DEVICES HAVING NANOPOROUS LAYERS AND METHODS FOR MAKING THE SAME



(57) Abstract: Medical devices with therapy eluting components and methods for making same are disclosed, specifically implantable medical devices having at least one porous layer, and methods for making such devices, and loading such devices with therapeutic agents. A mixture or alloy is placed on the surface of a medical device, then one component of the mixture or alloy is generally removed without generally removing the other components of the mixture or alloy. A porous layer is adapted for bonding non-metallic coating, including drug eluting polymeric coatings. A porous layer may have a random pore structure or an oriented or directional grain porous structure. One embodiment relates to medical devices, including vascular stents, having at least one porous layer adapted to resist stenosis or cellular proliferation without requiring elution of therapeutic agents. The invention also includes methods, devices, and specifications for loading of drugs and other therapeutic agents into nanoporous coatings.

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	JMENTS CONSIDERED TO BE RELEVANT	Relevant to claim No.					
Category *	Citation of document, with indication, where a US 2004/0148015 A1 (LYE et al) 29 July 2004 (29.0	1-16, 24-26					
X	paragraphs [0007], [0014], [0016], [0019].	1-10, 24-20					
Y	paragraphs [0007], [0014], [0010], [0015].	17-23, 27					
^							
Y, P	US 2005/0079200 A1 (RATHENOW et al) 14 April	17-19					
	[0033] and [0109].						
Y, P	US 6,805,898 B1 A (WU et al) 19 October 2004 (19.	20-23, 27					
. 1	25.	1, 2, 7, 24, 25					
A	US 3,993,072 A (ZAFFARONI) 23 November 1976 (23.11.1976), see abstract and Example			1, 2, 1, 24, 23			
A	1. US 6,240,616 B1 (YAN) 05 June 2001 (05.06.2001), see entire document,			1-27			
·	00 0,210,010 21 (11111) 00 00110 =000 (0000=000)	,	İ				
x	ERFEBACHER, J. et al. Evolution of Nanoporosity	n Dealloying. Nature 4:	10, March 2001,	1, 24			
	pages 450-453.						
l l							
Fronthon	documents are listed in the continuation of Box C.	See patent f	amily annex.				
<del></del>		<b>—</b>		national filing date or priority			
•	pecial categories of cited documents:	date and not in	conflict with the applica	tion but cited to understand the			
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	published prior to the international filing date but later than the ate claimed	"&" document men	nber of the same patent fa	mily			
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