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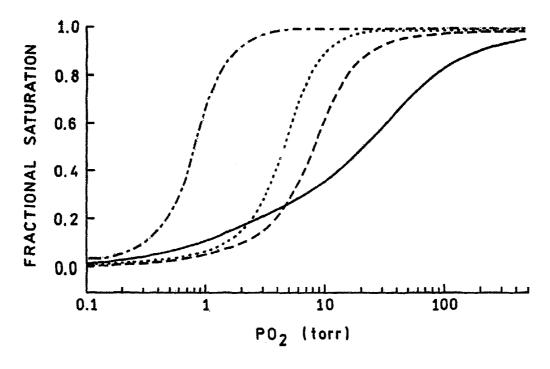
- (71) Applicants: TEMPLE UNIVERSITY OF THE COM-MONWEALTH SYSTEM OF HIGHER EDUCATION [US/US]; Office of Technology, Temple University, Philadelphia, PA 19122-6099 (US). JOHNS OPKINS UNIVERSITY LTD [US/US]; Licensing & Technology Development, 100 N. Charles Street, 5th Floor, Baltimore, MD 21201 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): FRONTICELLI, Clara [US/US]; 11514 Pebble Creek, Timonium, MD

21093 (US). **BRINIGAR, William, S.** [US/US]; 2217 Stackhouse Drive, Yardley, PA 19067 (US).

- (74) Agents: CARANGO, Paul et al.; Piper Rudnick LLP, Suite 4900, 1650 Market Street, Philadelphia, PA 19103 (US).
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[Continued on next page]

(54) Title: BLOOD SUBSTITUTES



(57) Abstract: The functional characteristics of heme proteins can be modified to produce hemoglobins that can be used as blood substitutes in different therapeutic applications. Stable polymers of tetrameric hemoglobin, and of myoglobin molecules, are provided for use in the blood substitutes.

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IPC(7) : A61K 35/14 US CL : 530/385					
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched					
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C. DOCUMENTS CONSIDERED TO BE RELEVANT				Relevant to claim No.	
Category *		Citation of document, with indication, where appropriate, of the relevant passages			
Х	KROLL, J. et al. Chemical reactions of Benzyl Isothiocyanate with Myoglobin. 1996. J. Sci. Food Agric. Vol 72, pages 376-384.			1, 2, 8-10, 18, 19	
A	1 300 11grio. 101 12, pagos 310 301.			3-7, 11-15, 17, 20	
	1				
Х	US 5,888,766 (ISHIZUKA et al.) 30 March 1999. (30.03.1999).			16	
	TIO 5 000 500 (HOPENAN) of al \ 00 Index 1001 (00 h7 1001)			21-46	
A	US 5,028,588 (HOFFMAN et al.) 02 July 1991 (02.07.1991).			21 .0	
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Further documents are listed in the continuation of Box C.			later document published after the inte	mational filing date or priority	
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