

Title (en)
Method for electroplating hard chrome layers

Title (de)
Verfahren zur galvanischen Abscheidung von Hartchromschichten

Title (fr)
Procédé de dépôt galvanique de couches en chrome dur

Publication
EP 2180088 B2 20190612 (DE)

Application
EP 08018462 A 20081022

Priority
EP 08018462 A 20081022

Abstract (en)
[origin: EP2180088A1] The method comprises contacting a substrate surface to be coated with chromium-containing electrolytes in a cell at 30-85[deg] C for galvanic deposition, and applying a voltage between the substrate surface to be coated and a counter electrode for galvanically depositing a first hard chromium layer on the substrate surface, where the deposition takes place in a container that is gas-tight against environment and a low pressure is adjusted during applying the voltage in the container. The substrate surface and chromium-containing electrolytes are moved with relative speed of greater than 1-5 m/s. The method comprises contacting a substrate surface to be coated with chromium-containing electrolytes in a cell at 30-85[deg] C for galvanic deposition, and applying a voltage between the substrate surface to be coated and a counter electrode for galvanic deposition of a first hard chromium layer on the substrate surface, where the deposition takes place in a container that is gas-tight against the environment and a low pressure is adjusted during applying the voltage in the container. The substrate surface and chromium-containing electrolytes are moved with a relative speed of greater than 1-5 m/s. A second hard chromium layer is deposited on the first hard chromium layer, where a pulse current is applied between the substrate surface and the counter electrode for the deposition of the first hard chromium layer and a direct current is applied for the deposition of the first hard chromium layer on the second hard chromium layer. A pressure difference is adjusted to an ambient pressure of 20-200 mbar. The pulse current for the deposition of the first hard chromium layer is applied with a frequency of 50-1000 Hz. For the deposition of the hard chromium layer, a current density is adjusted to 50-500 A/dm², where pH value in the electrolytes is adjusted to = 1. The chromium-containing electrolytes flow into the cell from below and over an overflow.

IPC 8 full level
C25D 5/00 (2006.01); **C25D 5/04** (2006.01); **C25D 5/08** (2006.01); **C25D 5/12** (2006.01); **C25D 5/18** (2006.01); **C25D 21/00** (2006.01); **C25D 21/04** (2006.01); **C25D 7/10** (2006.01)

CPC (source: EP KR US)
C25D 5/003 (2013.01 - EP KR US); **C25D 5/04** (2013.01 - EP KR US); **C25D 5/08** (2013.01 - EP KR US); **C25D 5/12** (2013.01 - EP KR US); **C25D 5/18** (2013.01 - EP KR US); **C25D 5/623** (2020.08 - EP KR US); **C25D 5/625** (2020.08 - EP KR US); **C25D 5/627** (2020.08 - EP KR US); **C25D 7/10** (2013.01 - KR); **C25D 21/00** (2013.01 - EP US); **C25D 21/04** (2013.01 - EP KR US); **C25D 7/10** (2013.01 - EP US)

Citation (opposition)
Opponent :
• DE 19953318 A1 20000621 - TOKICO LTD [JP]
• "Modern Electroplating", part 7 2000, JOHN WILEY & SONS, ISBN: 0-471-16824-6, article MANDICH, N.V. ET AL: "Electrodeposition of Chromium", pages: 289 - 292

Designated contracting state (EPC)
DE ES FR IT PL

DOCDB simple family (publication)
EP 2180088 A1 20100428; EP 2180088 B1 20110511; EP 2180088 B2 20190612; BR PI0920600 A2 20151222; BR PI0920600 B1 20190528; CN 102257184 A 20111123; CN 102257184 B 20140115; ES 2363566 T3 20110809; ES 2363566 T5 20200416; JP 2012506496 A 20120315; JP 5739341 B2 20150624; KR 101658254 B1 20160920; KR 20110075028 A 20110705; PL 2180088 T3 20110930; PL 2180088 T5 20201116; US 2011198226 A1 20110818; WO 2010048404 A1 20100429

DOCDB simple family (application)
EP 08018462 A 20081022; BR PI0920600 A 20091022; CN 200980151479 A 20091022; ES 08018462 T 20081022; JP 2011533333 A 20091022; KR 20117011605 A 20091022; PL 08018462 T 20081022; US 2009061683 W 20091022; US 200913125622 A 20091022