#27

Problems to be solved and Technological Evolution of Magnetic Recording Media

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Recording Layer

- Pure Cobalt, Co
- Binary Alloys such as Co-Ni,
  Co-Pt, Co-Cr
- Ternary Alloys such as Co-Cr-X
- Bi-layer by laminating
- Multilayered structure
- Antiferromagnetically coupled
- Magnetic Moment Design

Underlayer

- Pure Chromium, Cr
- Binary Alloys such as Cr-Ti, Cr-Si, Cr-W
- Ternary Alloys such as Cr-Ti-B
- Multilayered structure
- Divided functions for each layer such as adhesion and crystallographic orientation control

40 Inventive Principles *

- Segmentation (#1)
- Another Dimension (#17)

  From single to multi
- Composite Materials (#40)

*Darrell Mann, Simon Dewulf, Boris Zlotin, and Alla Zusman, "Matrix 2003: Updating the TRIZ Contradiction Matrix," CREAX Press, Belgium, pp.117-121 (July 2003).

37 Most Important Combined and Special Inventive Principles**

Matrix 2003

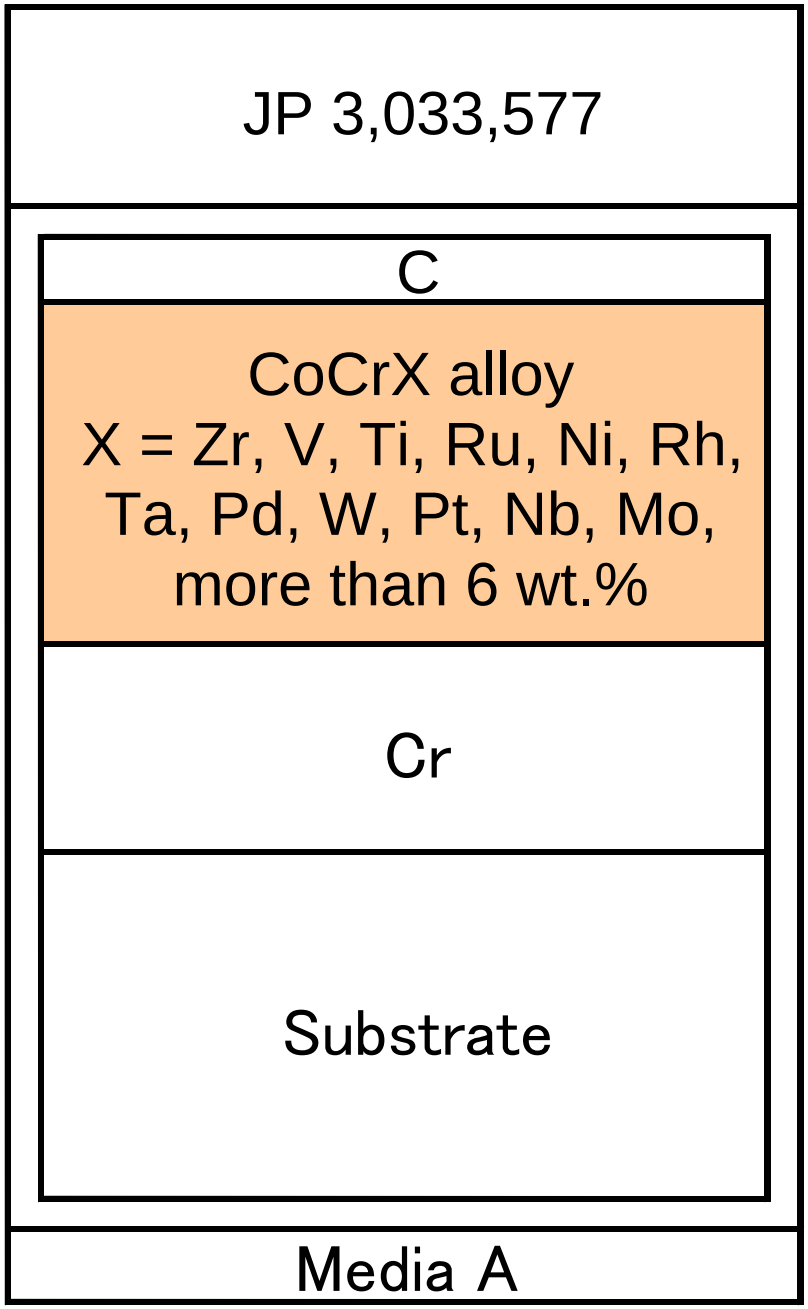
- Transform an Object Micro-Structure (#63)
- Modify or Substitute the System (#68)
- Localize and/or Locally Weaken a Harmful Effect (#71)

**Darrell Mann, Simon Dewulf, Boris Zlotin, and Alla Zusman, "Matrix 2003: Updating the TRIZ Contradiction Matrix," CREAX Press, Belgium, pp.122-126 (July 2003).

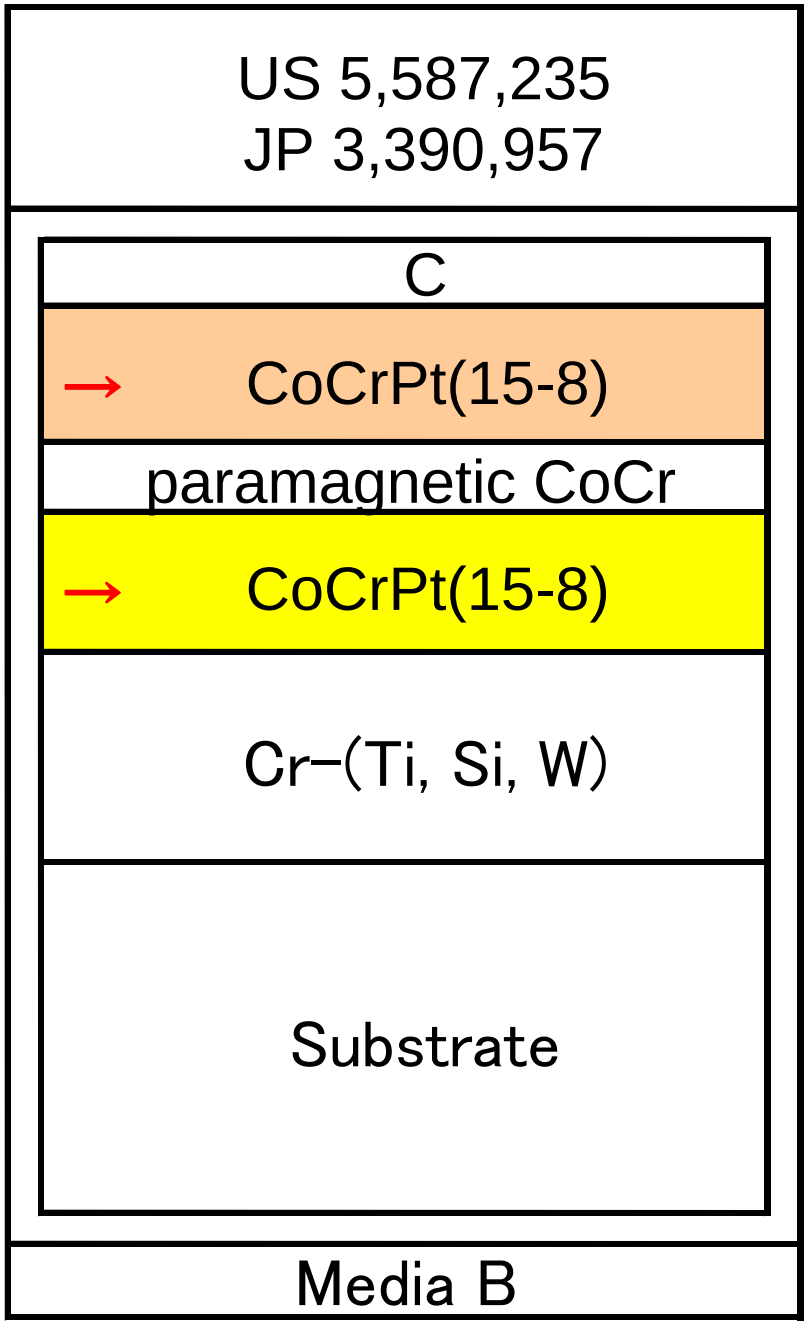
Trends of Evolution***

- “Mono – Bi – Poly”
- Increase of
  “Degree of Freedom”

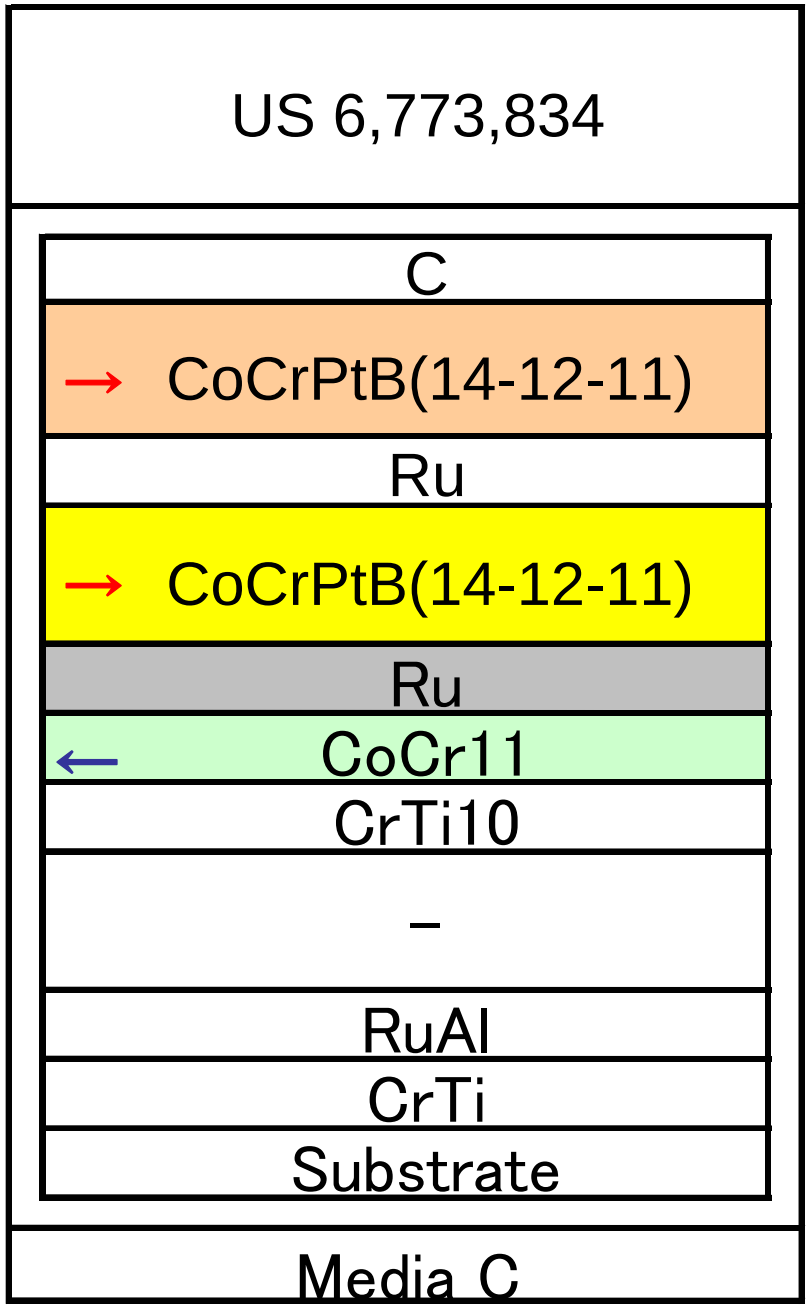
***Darrell Mann, “Hands-On Systematic Innovation,” pp.303-334, CREAX Press, Belgium, (May 2002).



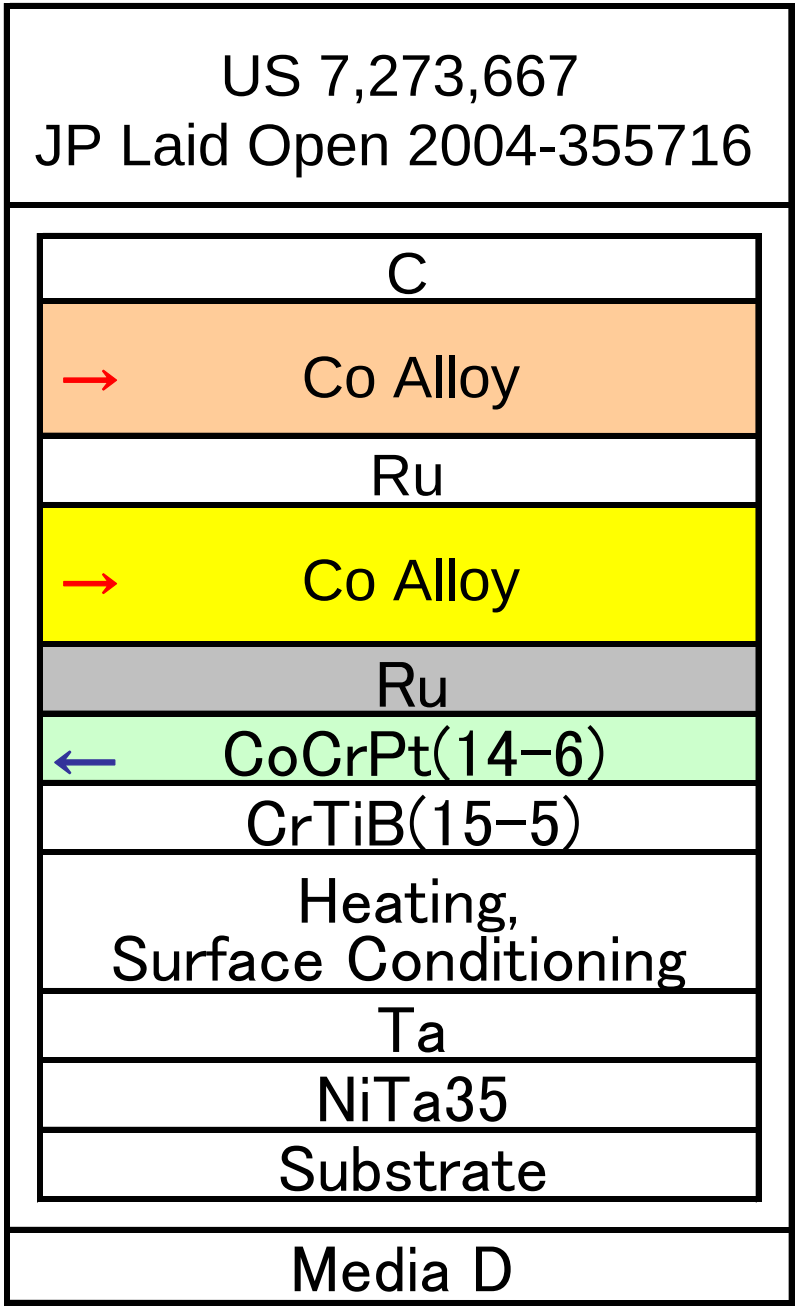
A3縦


US 5,587,235
JP 3,390,957
C
CoCrPt(15-8)
paramagnetic CoCr
CoCrPt(15-8)
Cr–(Ti, Si, W)
Substrate
Media B

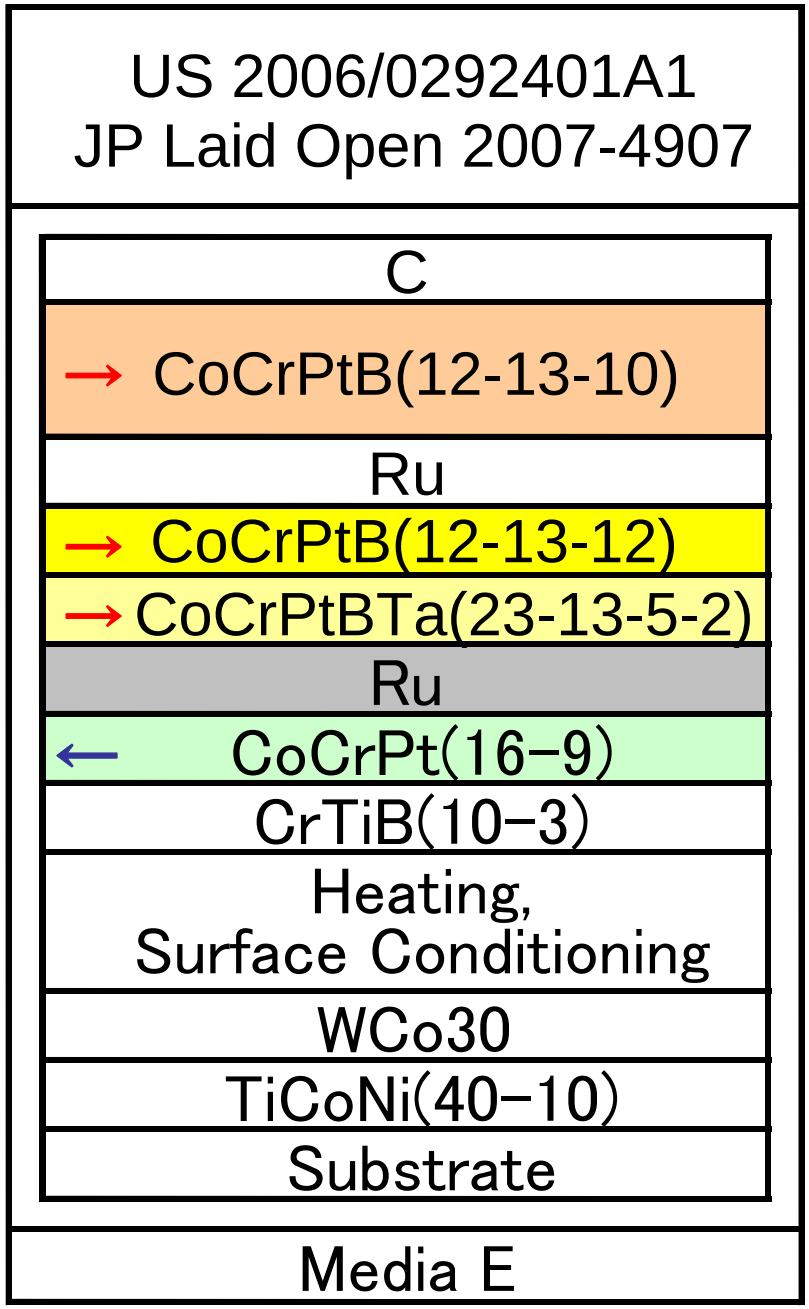
A3縦


US 6,773,834
C
→ CoCrPtB(14-12-11)
Ru
→ CoCrPtB(14-12-11)
Ru
← CoCr11
CrTi10
–
RuAl
CrTi
Substrate
Media C

A3縦


US 7,273,667
JP Laid Open 2004-355716
C
Co Alloy
Ru
Co Alloy
Ru
CoCrPt(14-6)
CrTiB(15-5)
Heating,
Surface Conditioning
Ta
NiTa35
Substrate
Media D

A3縦


US 2006/0292401A1
JP Laid Open 2007-4907
C
→ CoCrPtB(12-13-10)
Ru
→ CoCrPtB(12-13-12)
→ CoCrPtBTa(23-13-5-2)
Ru
← CoCrPt(16-9)
CrTiB(10-3)
Heating,
Surface Conditioning
WCo30
TiCoNi(40-10)
Substrate
Media E

A3縦