Patents for Lithographie - from Europe to China

Thomas Okon
Carl Zeiss SMT GmbH
MIP - IP in Asia, Munich, June 11th, 2015
Lithography - ancient

λίθος = litho = stone
γράφειν = graphein = to write
= 2-dimension printing technique
Alois Senefelder (1798)
Lithography – today

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Charles Marion Russell’s
The Custer Fight (1903)

Microlithography
to efficiently produce
highly Integrated Circuits
(today)
Lithography – today – resolution

resolution ~ Millimeters
= 10 human hairs between two printed lines

resolution ~ 10 Nanometers
> 3000 printed gates on diameter of a single hair
Lithography – today – working principle
Lithography – today – chip production

**Wafer Fab Equipment**
€ 31 billion
Source: Gartner Dataquest (March 2015)
today’s Chip Production take place in so-called fab’s located to a large extent in Asian Countries
Lithography – from Europe to China
filing - timing & country spread

priority filing in DE or EP
subsequent filing as PCT
national stages

Beneficial two decision steps after 12 and 30 months, respectively.
Article 78 (1) EPC:
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... a description of the invention ... one or more claims ... any drawings referred to in the description or the claims ...
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Lithography – Patents from DE/EP to CN
filing – requirements of patent application

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Rule 42 (1)
The description shall ...
Rule 43 (1)
The claims shall ...
Rule 46
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Chapter III
Sufficiency of disclosure
Chapter IV – Claims
(Art. 84 and formal requirements)
Lithography – Patents from DE/EP to CN
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T0918/91 (ADVANCED MICRO DEVICES, INC.)
The Board is, consequently, of the opinion that the application, as filed, directly and unambiguously discloses
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Lithography – Patents from DE/EP to CN
filing – patent application ... follows “European Style”
claims & their support

1. A retardation element, in particular in a microlithography
projection exposure machine, which consists of calcium fluoride crystal
and the optical axis of the retardation element is in direction of the
<110>-crystal axis

2. The retardation element as claimed in claim 1, wherein the
retardation element is plate, in particular a λ/4 plate

3. The retardation element as claimed in claim 1 or claim 2, wherein
the retardation element has a thickness variation of up to 2%.

4. The retardation element as claimed in one of the preceeding claims,
wherein the retardation element is a plate and it’s entry and / or exit face
is provided with a spherical structure.
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optimization of single claims

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filing – patent application ... follows “European Style”
claims repeated in description & technical effect

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It is also possible for one or both end faces to be formed spherically, such that the retardation plate can simultaneously contribute to the correction of the system.
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With the aid of figure 1, another embodiment of a catadioptric projection objective will be explained in the case in which a retardation element 17 in the form of a twice penetrated \( \lambda / 4 \) retarder is arranged … made from calcium fluoride crystal that is in the shape of a meniscus.

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Claim 1 not new wrt scientific paper may be overcome by “not a bug but a feature”

Claims 2, 4 not inventive, skilled uses often $\lambda/4$ plates & spherical structure in optics design

Claim 3 not inventive, skilled makes a finite number of experiments
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Application abandoned!
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1st office action in China

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Application abandoned...
... since technology no longer relevant !!
We make it visible.