ANSTEEL

# Progress of Advanced High Strength Steel in Ansteel

Institute of Iron and Steel Research

Ansteel Group

汽车与家电用钢研究所

Vehicle and Home Application Steel Research Institue

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# Contents

- Background
- Development of automobile steel in Ansteel
- Progress of advanced high strength steel in Ansteel
- Some problems to be solved

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# Green and Environment protection

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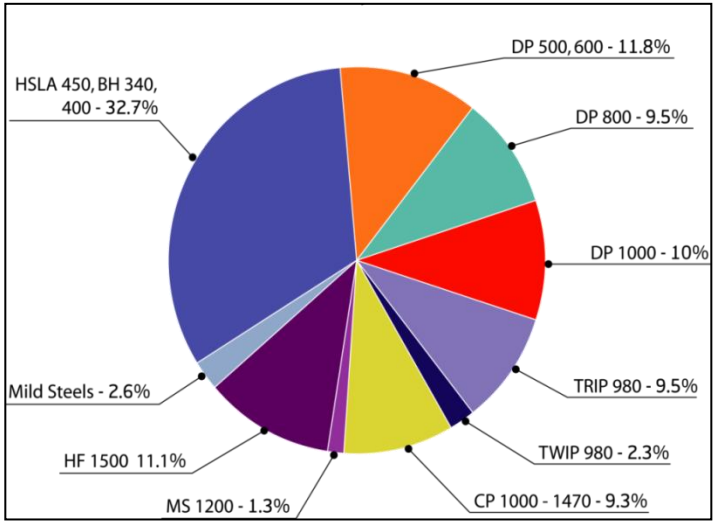
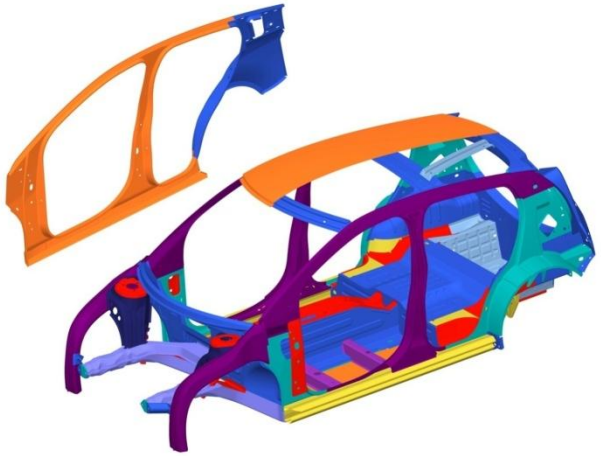
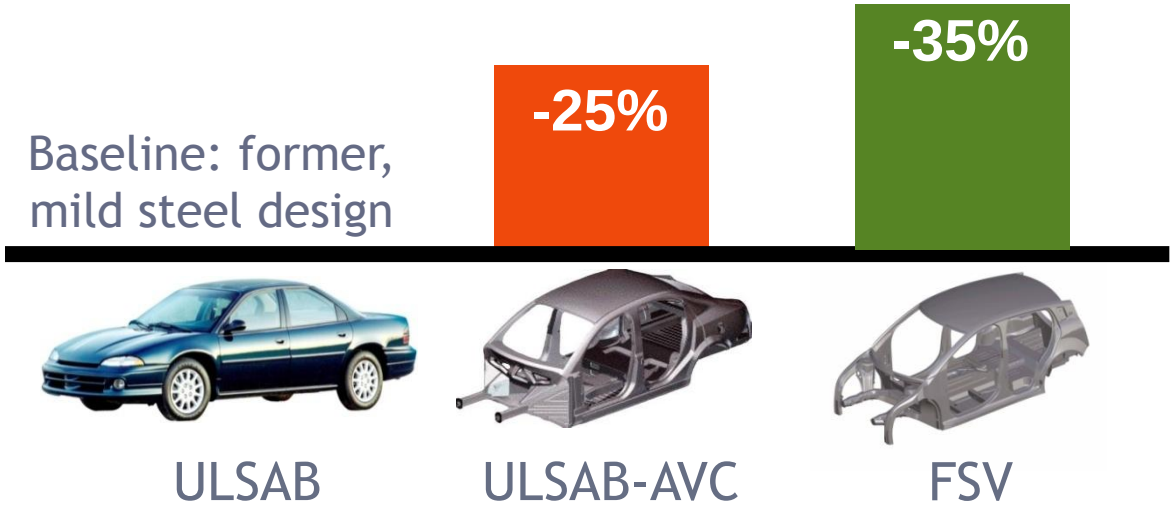
# Lightweighting----Advanced high strength steel



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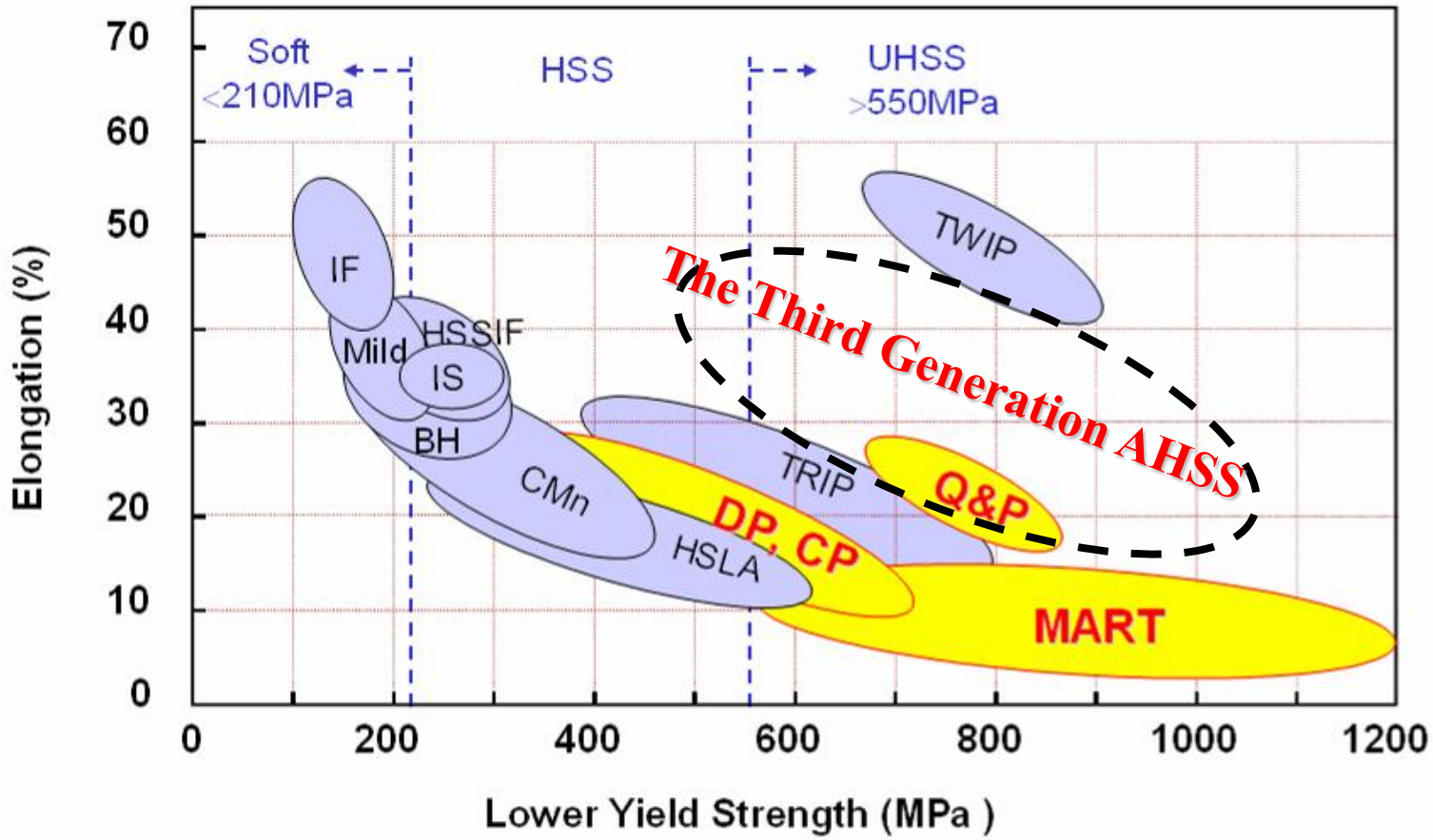
# Development of Automobile steel



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# Varieties of automobile steel available in Ansteel

| | varieties | TS/MPa | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | <250 | 340 | 370 | 410 | 440 | 490 | 540 | 590 | 780 | 980 | 1180 | 1270 | 1470 |
| Hot rolling | Beam steel | | ● | ● | ● | ● | ● | ● | ● | ● | ○ | | | |
| | Wheel steel | | ● | ● | ● | ● | ● | ● | ● | | | | | |
| | DP steel | | | | | | | | ● | ● | | | | |
| | Hydroforming steel | | | | | ● | ● | ● | ● | ● | ○ | | | |
| | Press hardening steel | | | | | | | | | | | ● | ● | ● |
| | TWIP | | | | | | | | | | ● | ○ | | |
| Cold rolling | Drawing steel | ● | | | | | | | | | | | | |
| | High strength IF steel | | ● | ● | | | | | | | | | | |
| | Phosphorus steel | | ● | ● | ● | ● | | | | | | | | |
| | BH steel | | ● | ● | ● | | ● | | | | | | | |
| | HSLA steel | | | | | ● | ● | | ● | | | | | |
| | DP steel | | | | | ● | ● | | ● | ● | ○ | ○ | | |
| | TRIP steel | | | | | | | | ● | ● | ● | | | |
| | TWIP steel | | | | | | | | | | ● | ○ | | |
| | QP steel | | | | | | | | | | ● | ○ | | |
| | Press hardening steel | | | | | | | | | | | | ● | ● |
| Hot –dip galvanized | Drawing steel | ● | | | | | | | | | | | | |
| | High strength IF steel | | ● | ● | | | | | | | | | | |
| | Phosphorus steel | | ● | ● | ● | ● | | | | | | | | |
| | BH steel | | ● | ● | | | | | | | | | | |
| | HSLA steel | | | | | ● | ● | | ● | | | | | |
| | DP steel | | | | | ● | ● | | ● | ● | ● | | | |
| | TRIP steel | | | | | | | | ● | ○ | ○ | | | |
| | TWIP steel | | | | | | | | | | ○ | | | |

note:● Commercial; ○ Under Development;

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长城汽车
时尚 科技 精美

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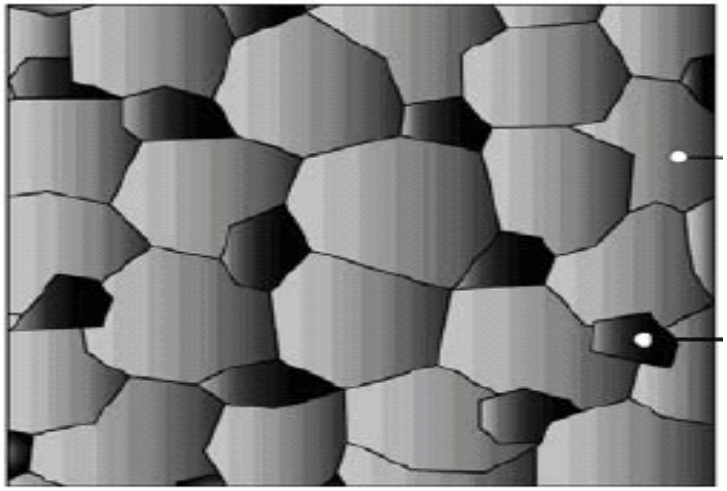
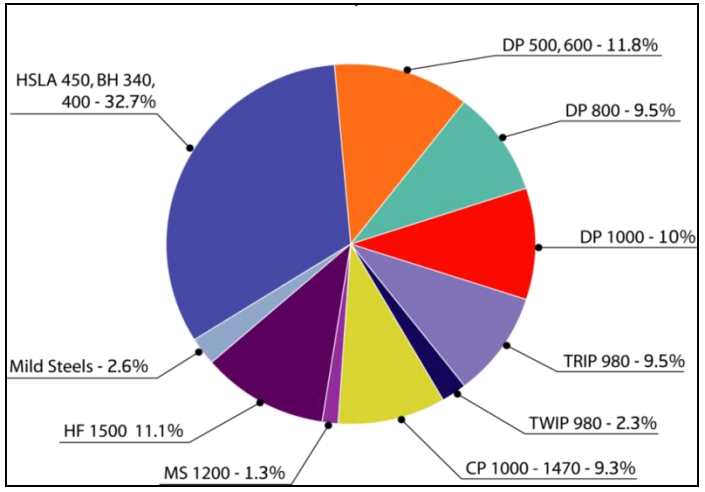
# DP (Dual Phase) Steel

- Microstructure: Ferrite+Martensite
- Strength grade: 450—1470MPa
- Production: CR, HR, GI/GA



Properties:

- High strain hardening rate
- Low yield-strength ratio
- BH: 35～80MPa



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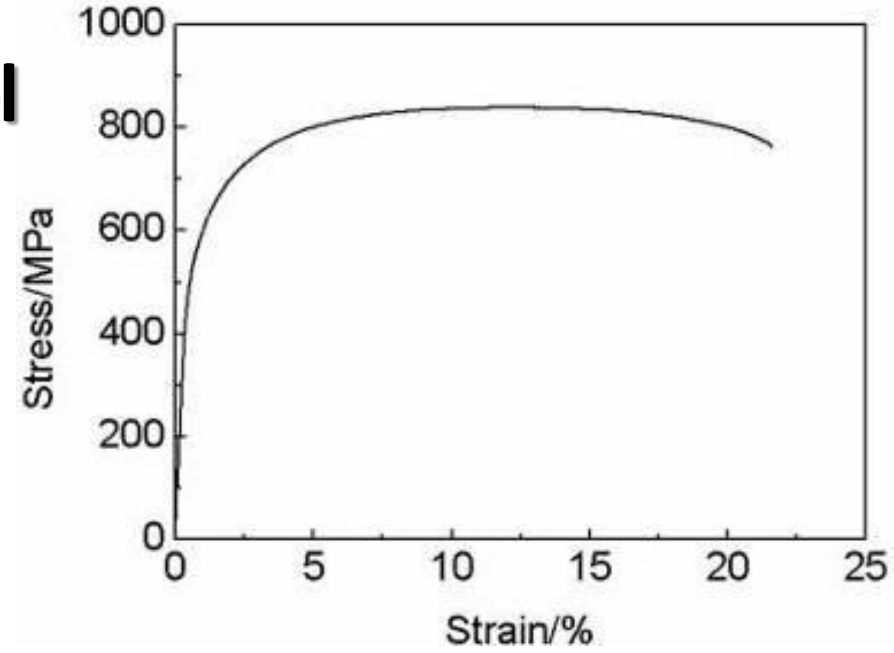
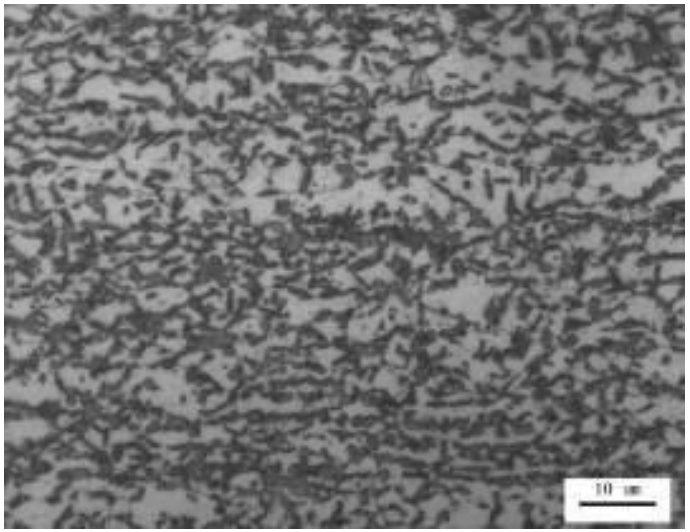
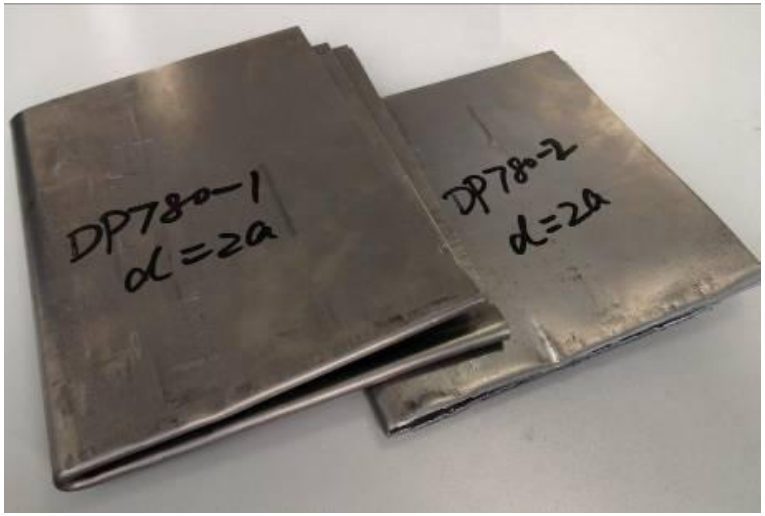
# Cold rolling DP780 steel

- High elongation
- Good bendability





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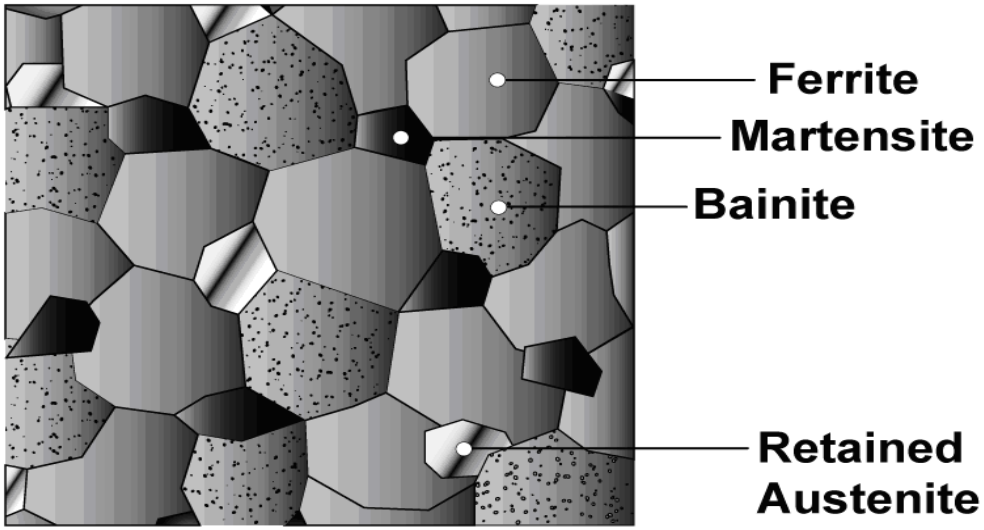
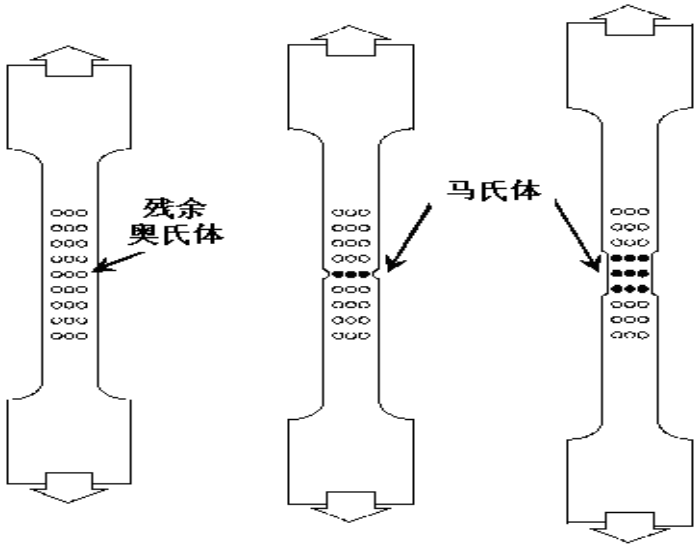
# Some problems in DP steel

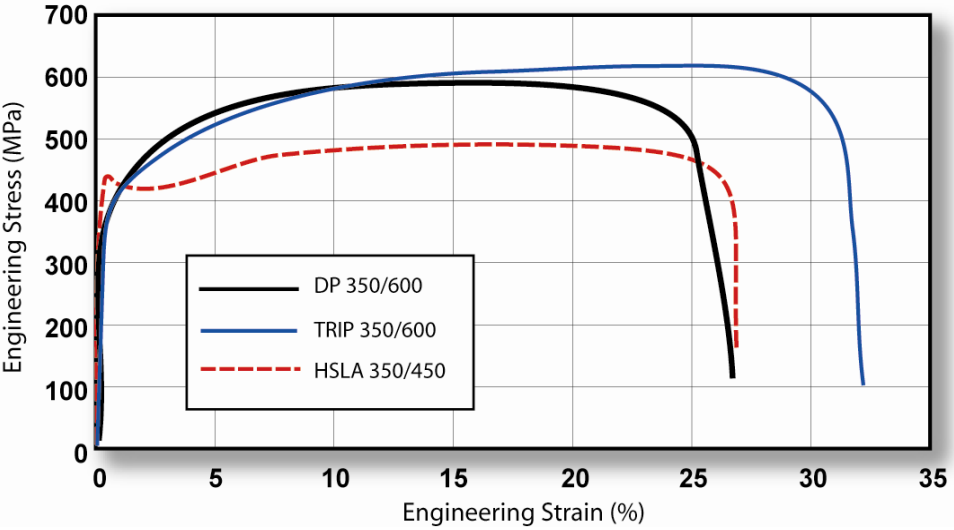
- **Future development**
  - **Low C DP steel**
  - **High HE DP steel**
  - **High elongation DP steel**

- **High elongation DP steel with adding Si ?**

# TRIP（Transformation induced plastic) Steel



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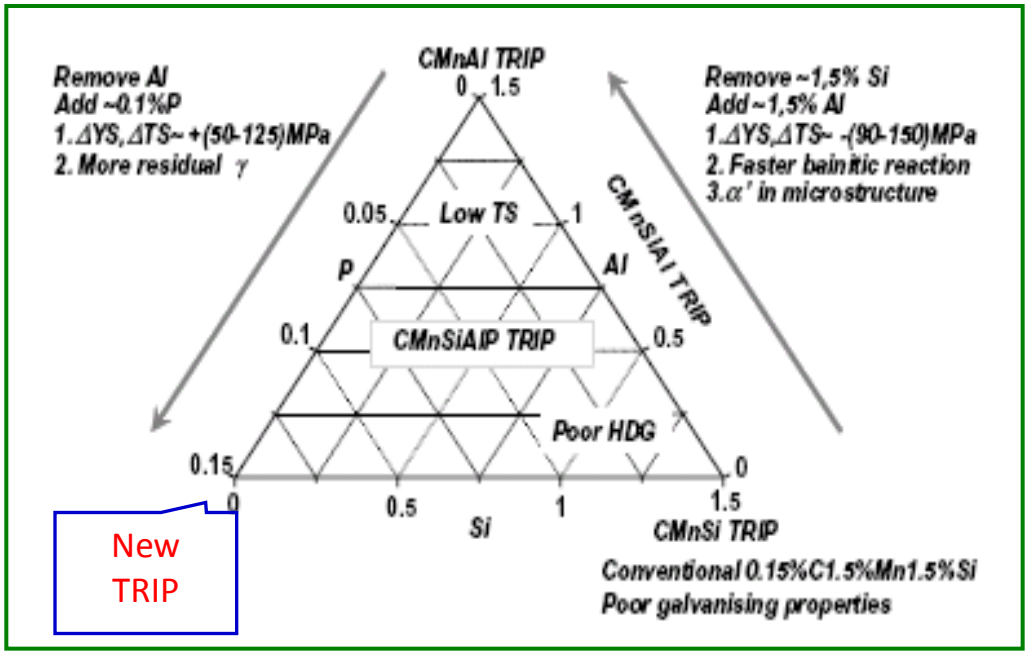
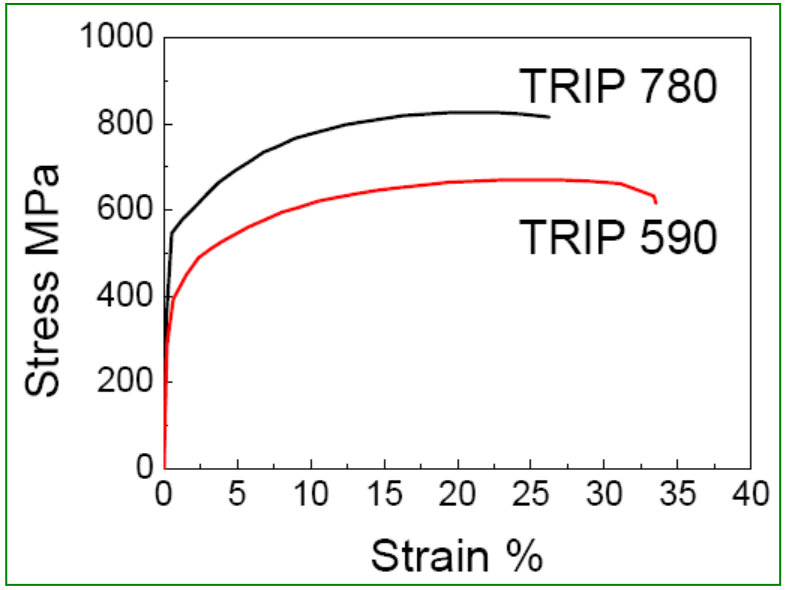
# TRIP steel



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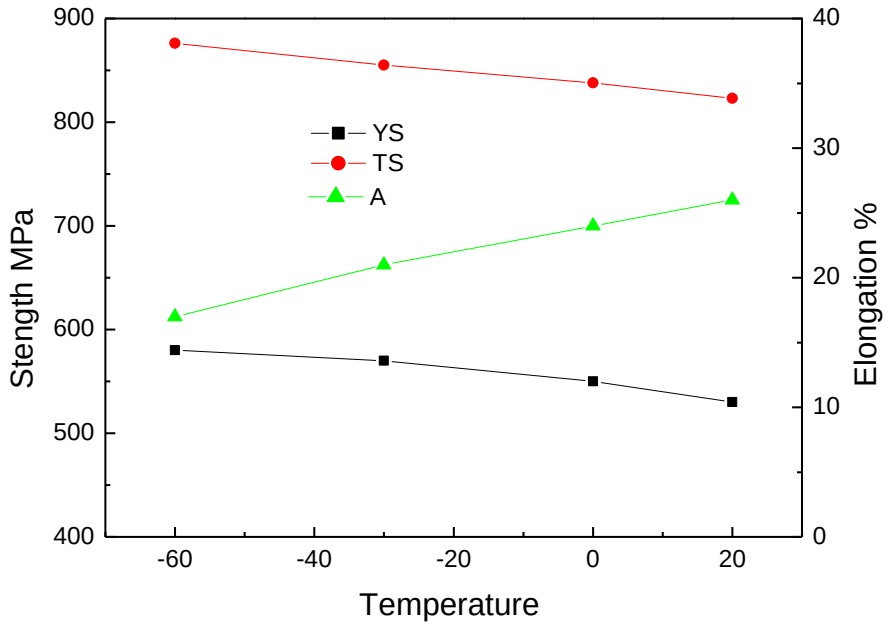
## P segregation at GBs?

- **Thermodynamics calculation**
- **Low T tensile test**



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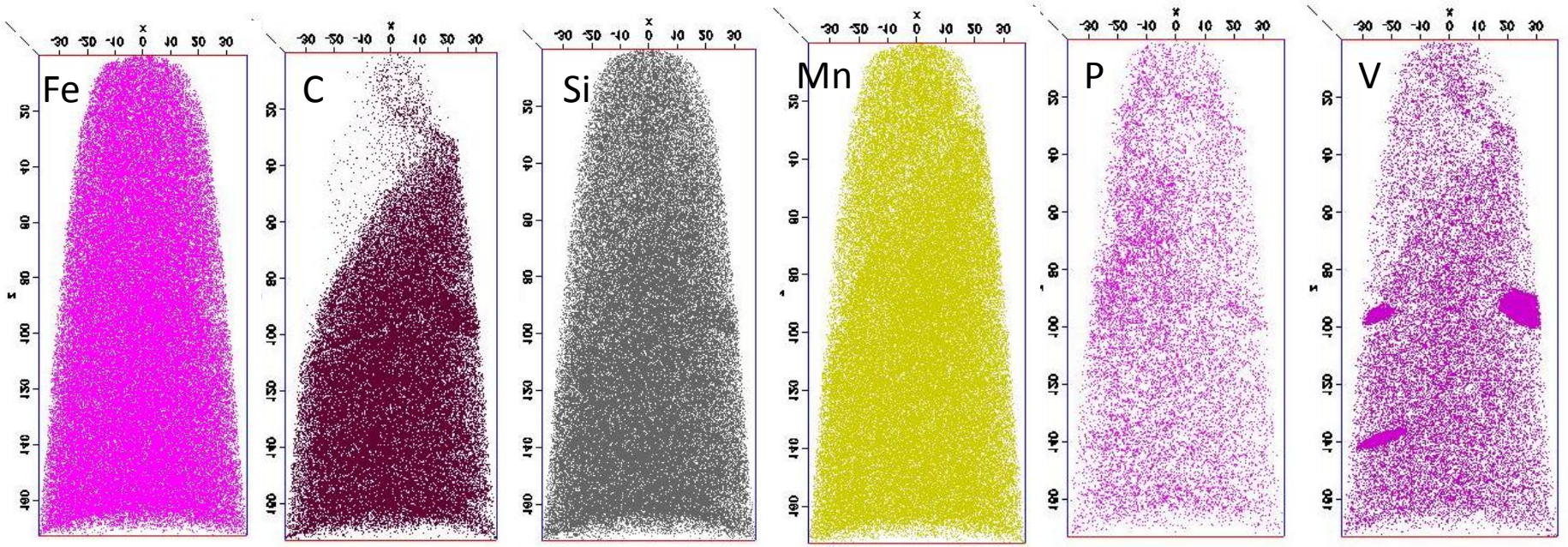
# Some results of APT



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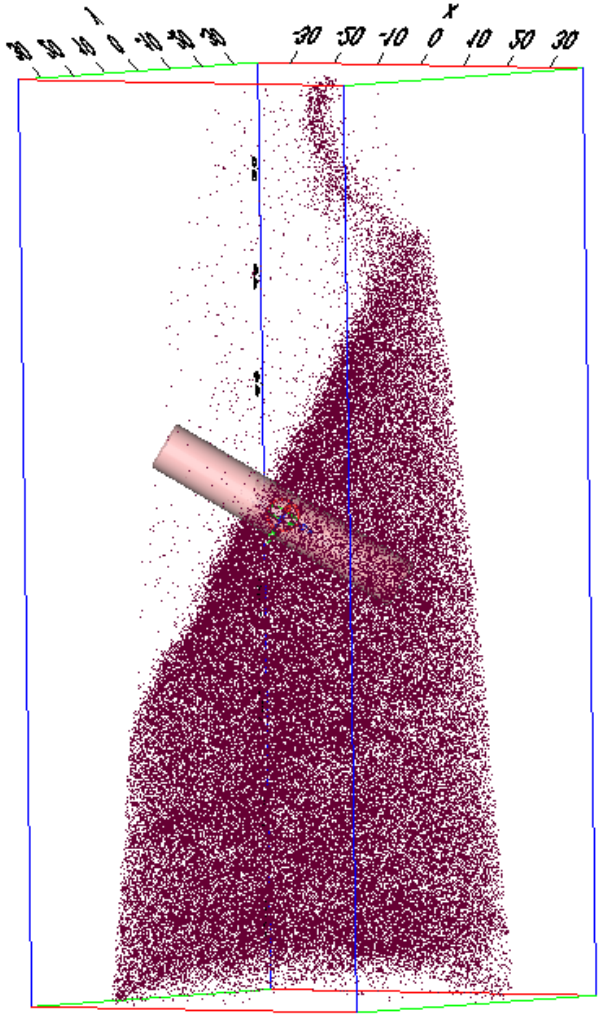
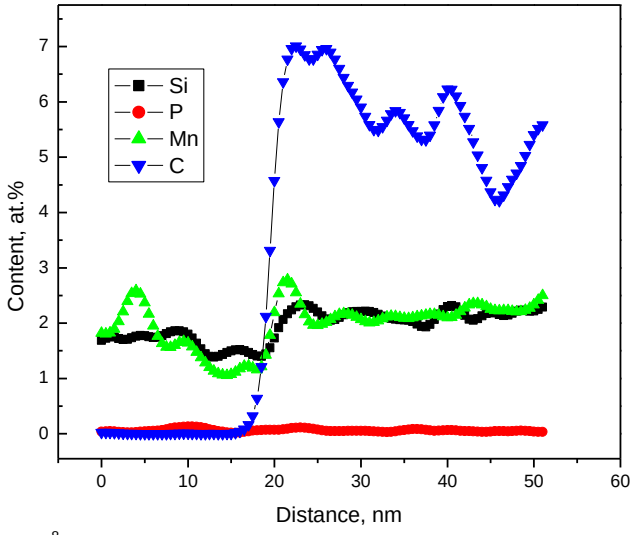
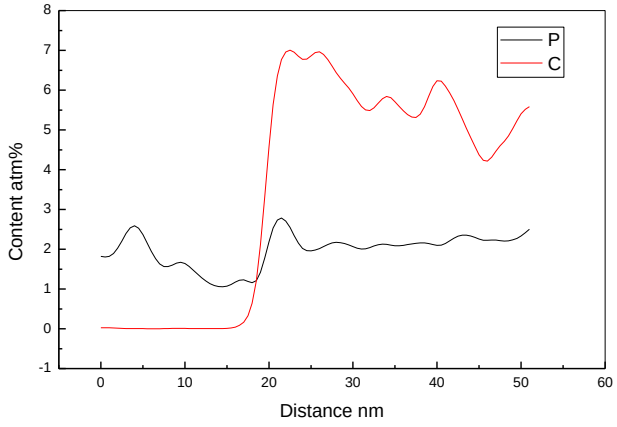
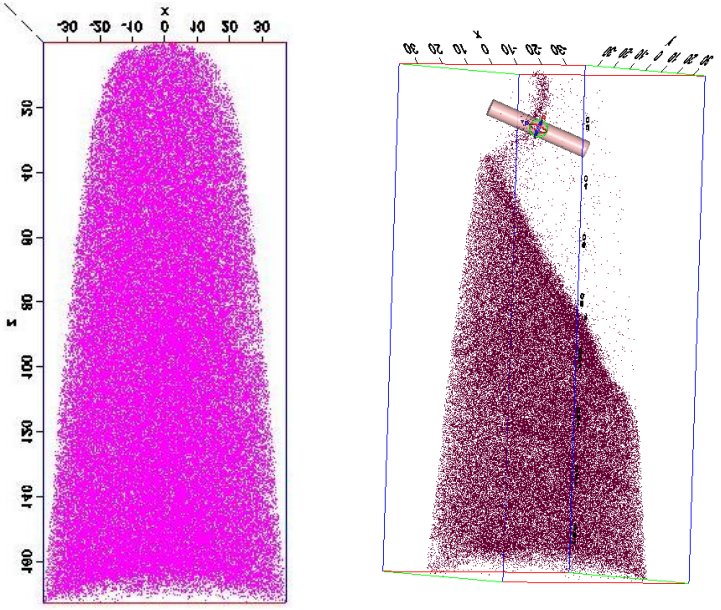
# Elements distribution at phase boundary

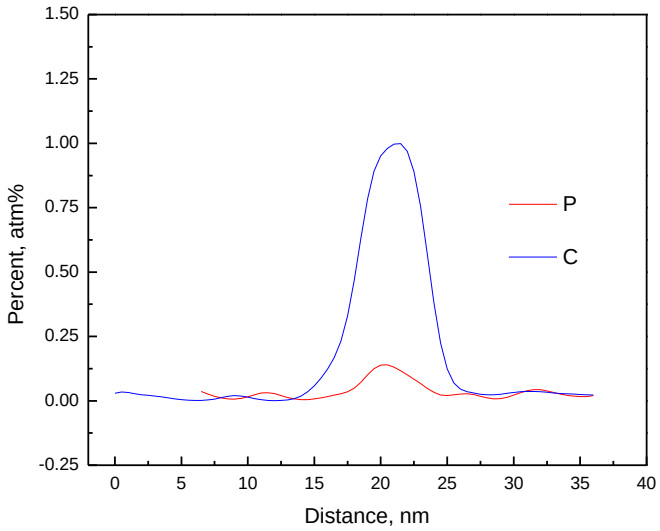




# C and P segregation at GBs






0.14%

0.09%

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# Some problems in TRIP steel

- Low HE ?
  - Refining grain
- Welding ?
  - δ-TRIP

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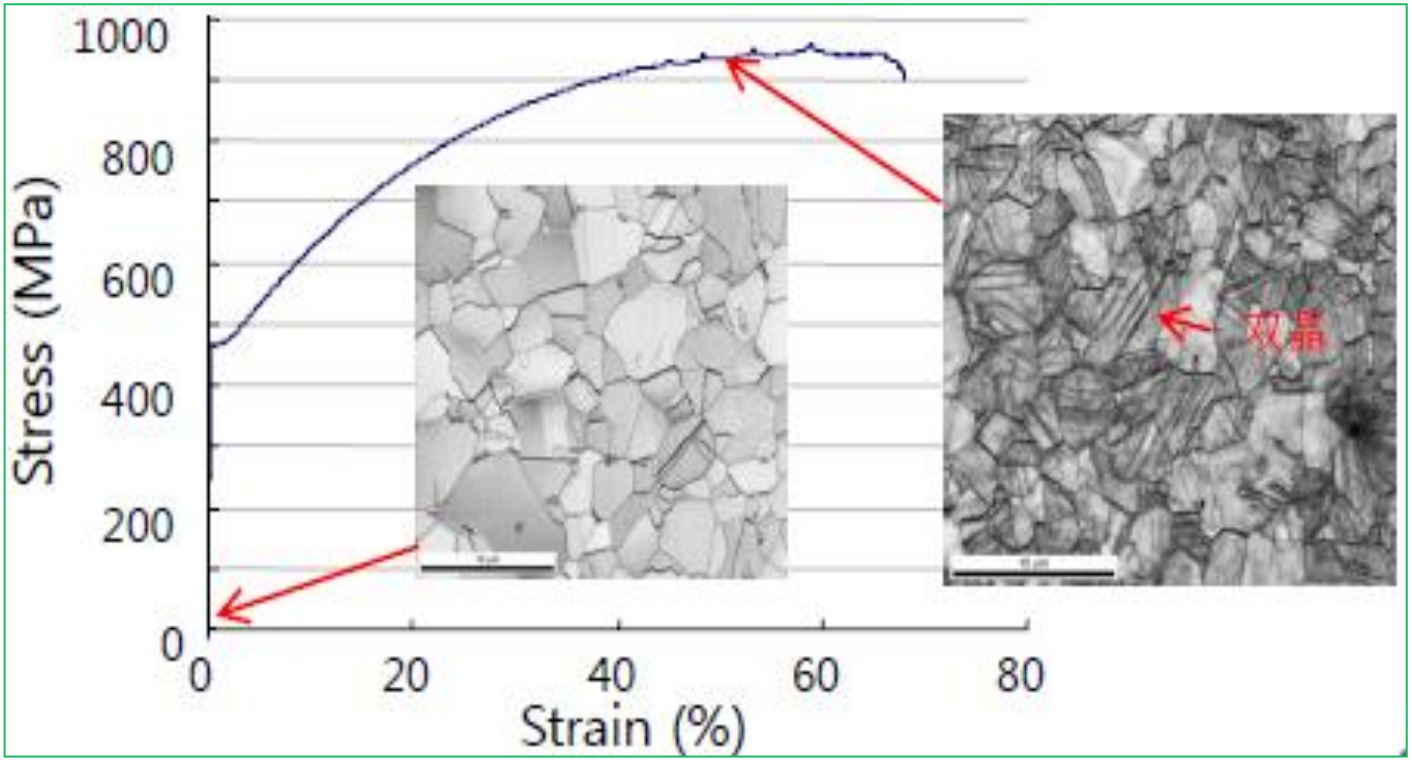
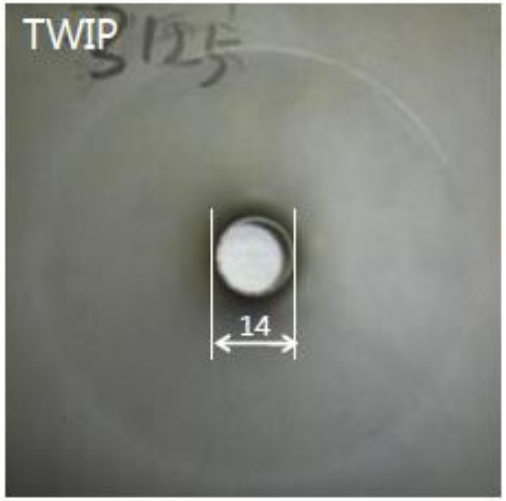
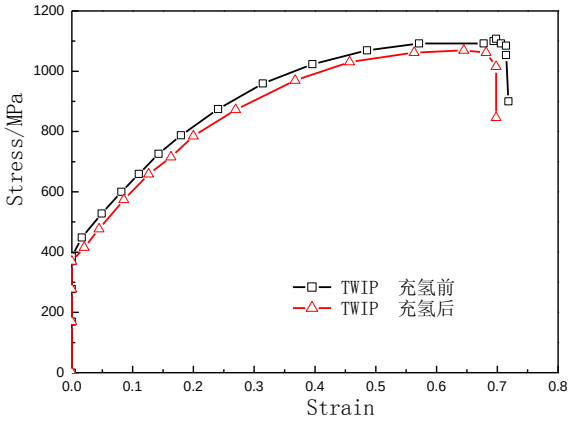
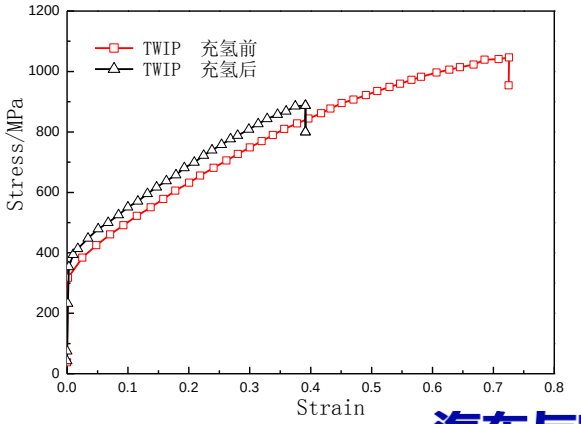
# TWIP（Twin induced plastic） Steel



# Excellent formability of TWIP steel



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# Some problems in TWIP steel

- New TWIP steel with high yield strength ?
- Zinc coated TWIP steel ?
- Delayed fracture?

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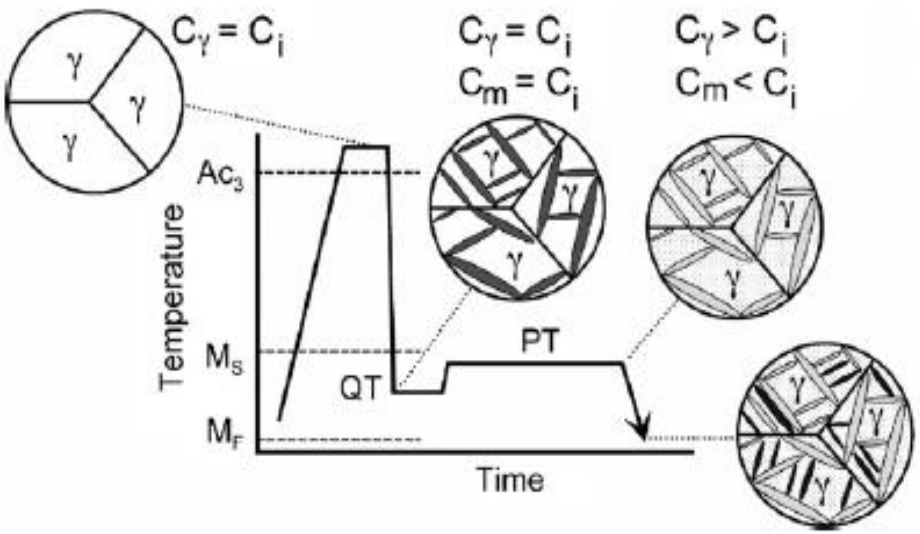
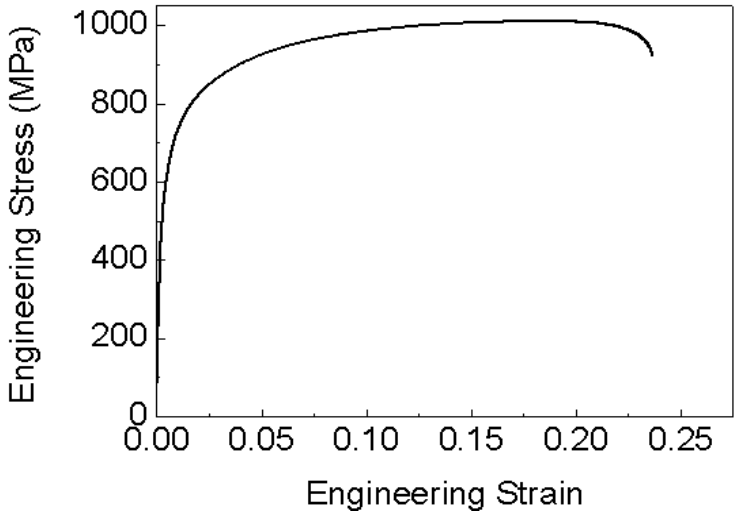
# Q&P steel



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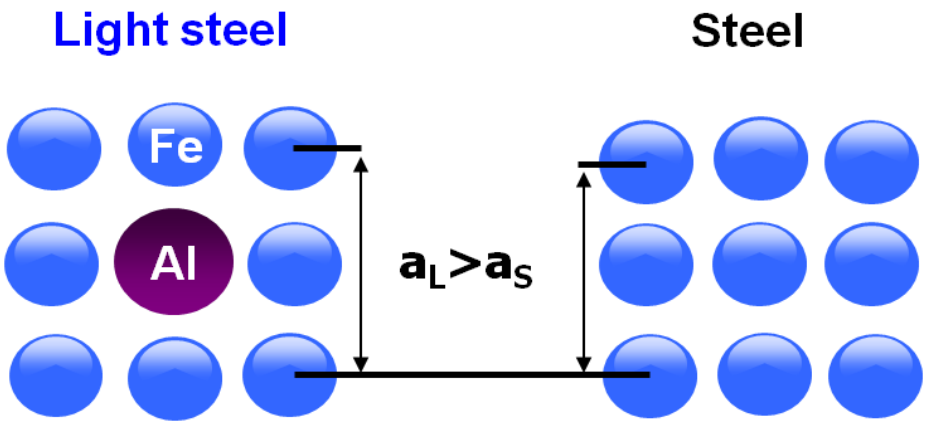
# Some problems in Q&P steel

- Austenite?

- HE?

# Light steel

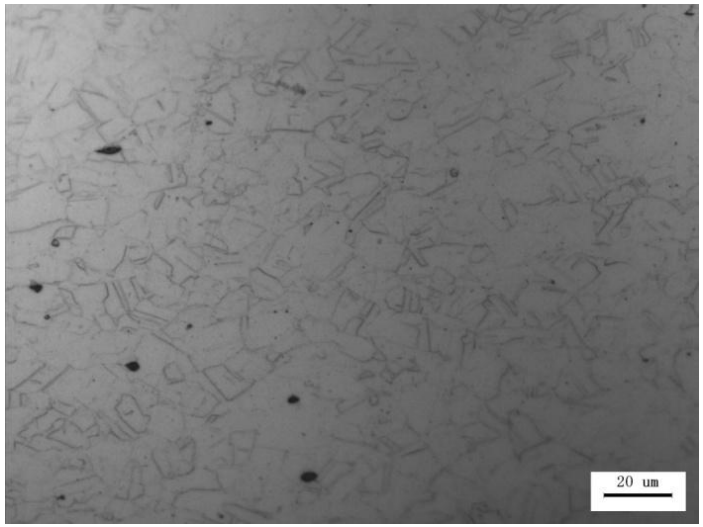


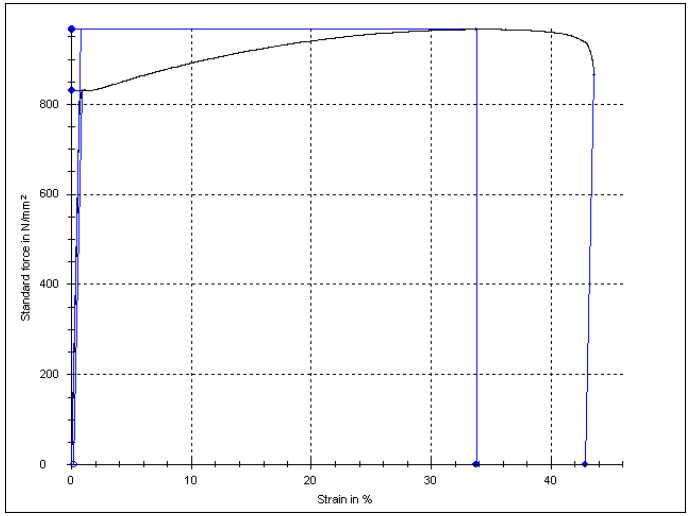

Fe-Mn-Al-C

High strength

High elongation

Low density



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# Some problems in Light steel

- Steelmaking?

- Commercial production?

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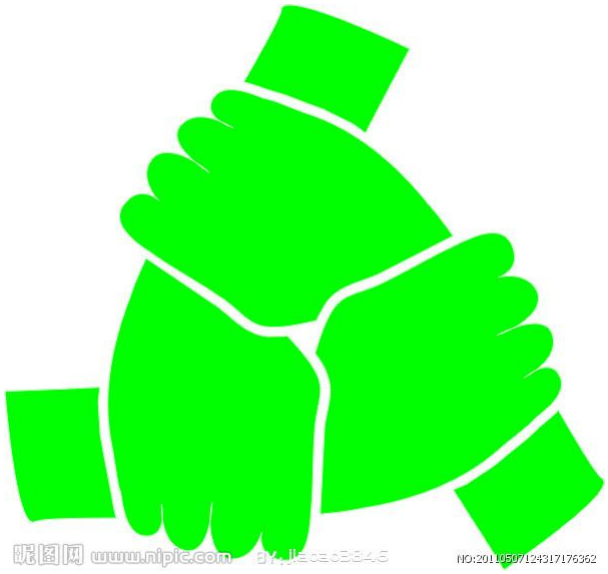
# Some problems to be solved

- Steelmaking
- Continuous casting
- Hot rolling
- Cold rolling
- Annealing
- Surface quality
- Forming
- Welding



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*Thank you for your attention!*

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