



MOMENTIVE
performance materials

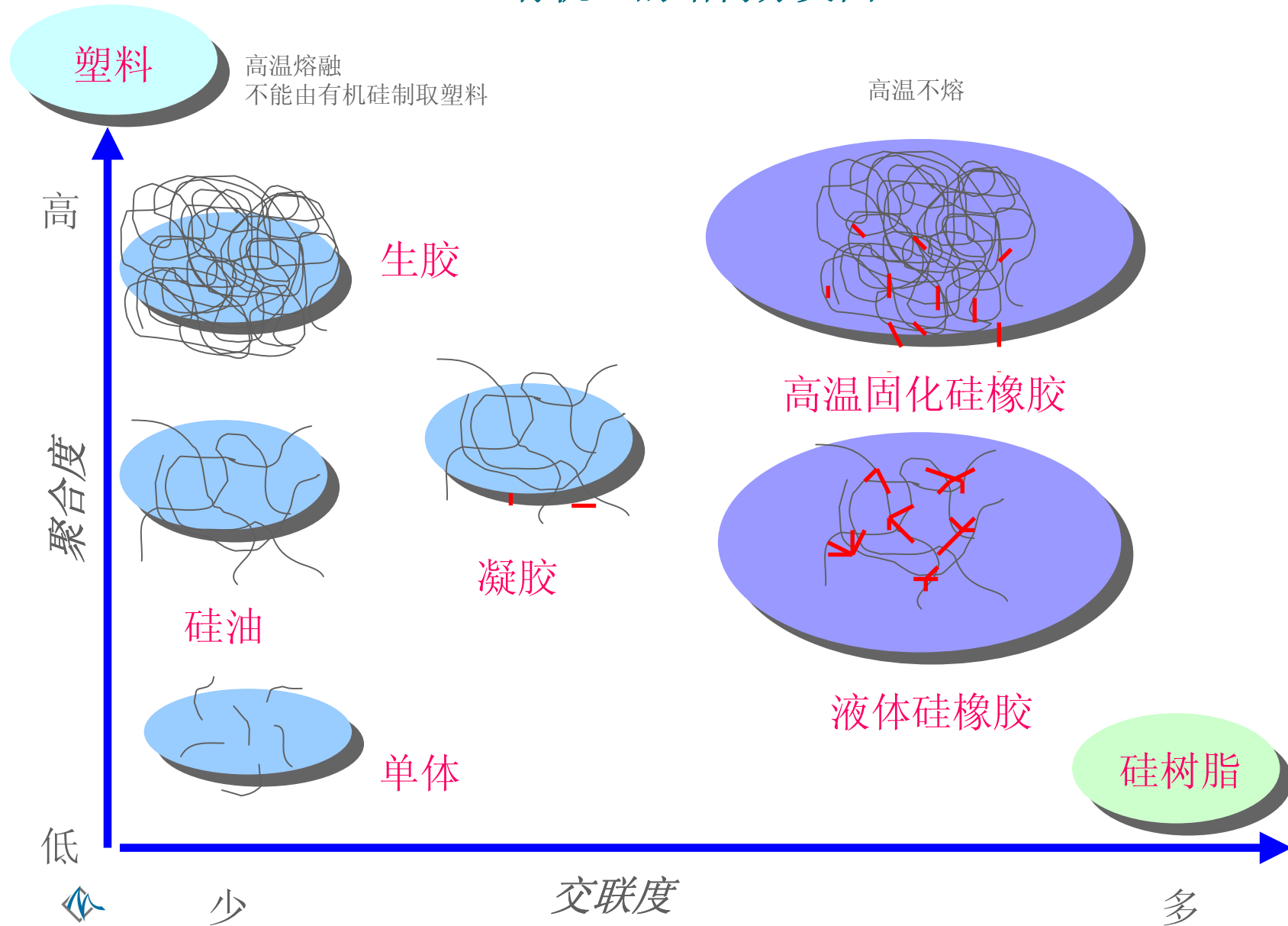
The science behind the solutions.

HCE/LIM技术与应用

杨 柱

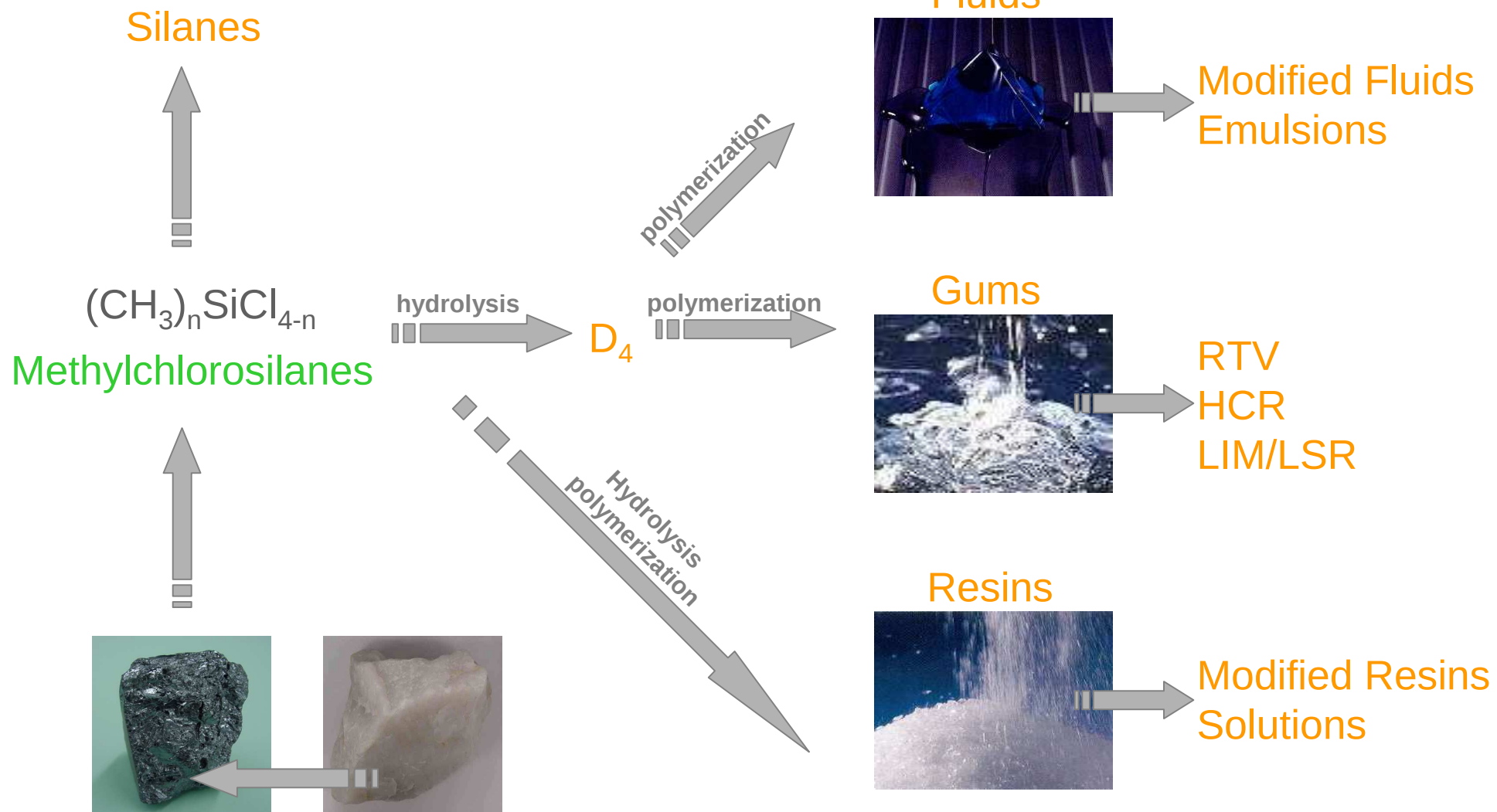
客户经理

有机硅的结构分类图

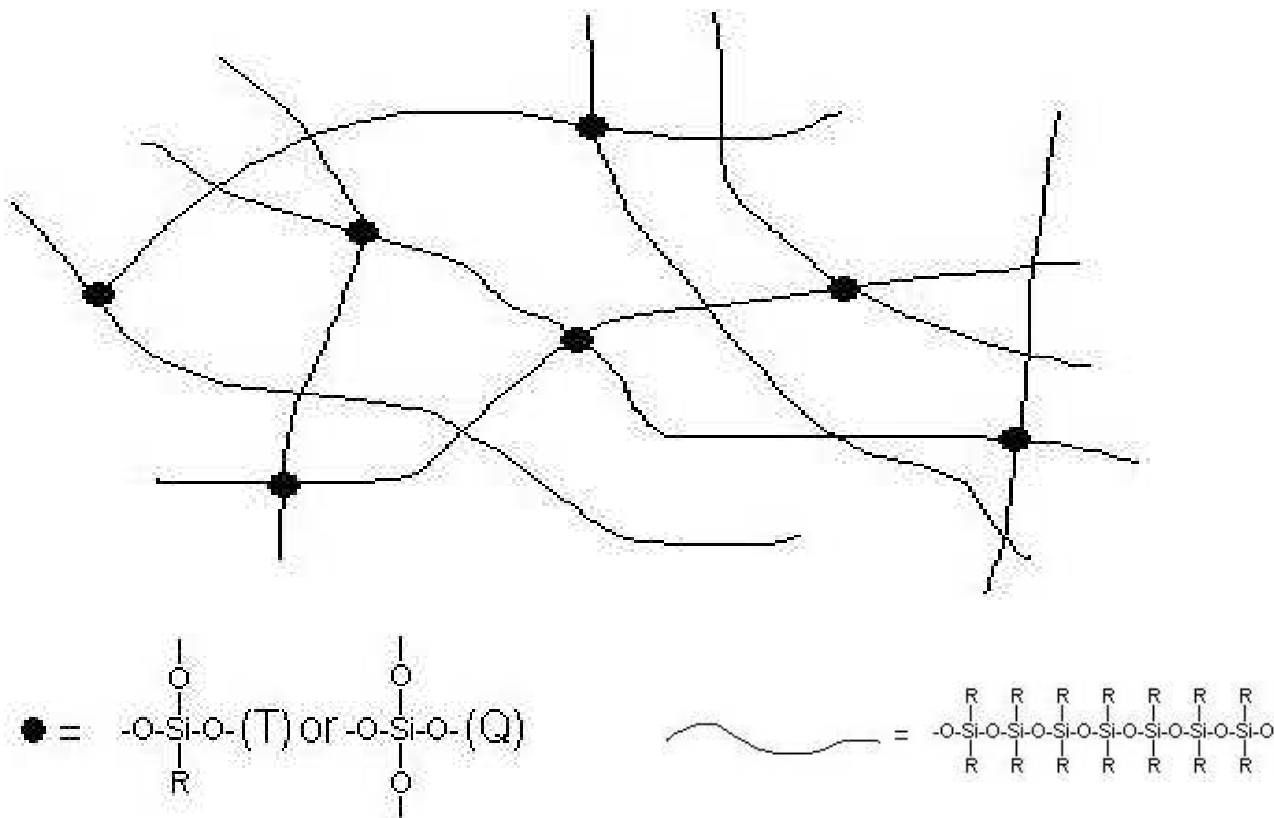


缤纷的有机硅世界

Silicone production

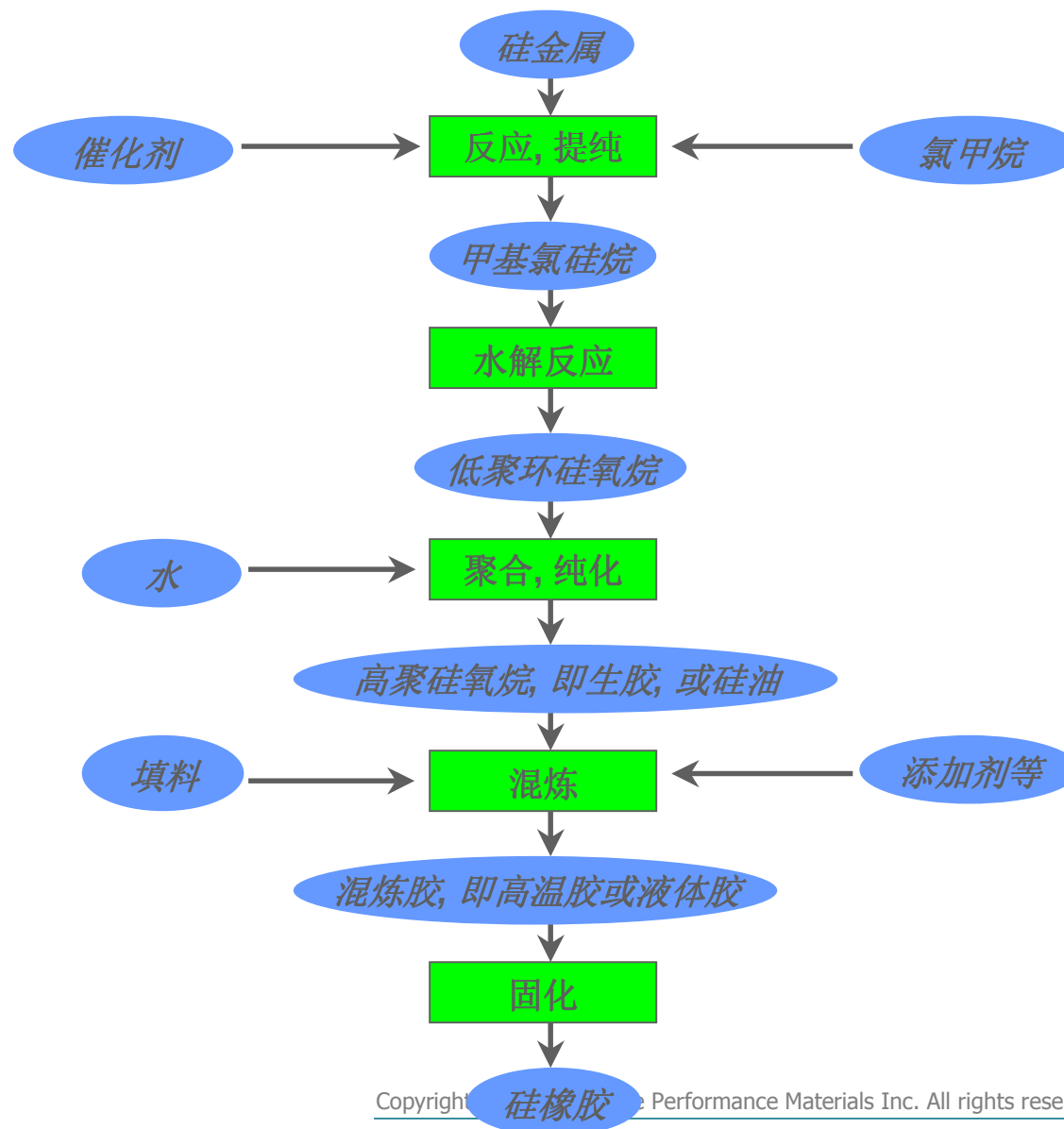


硅橡胶的基本构成

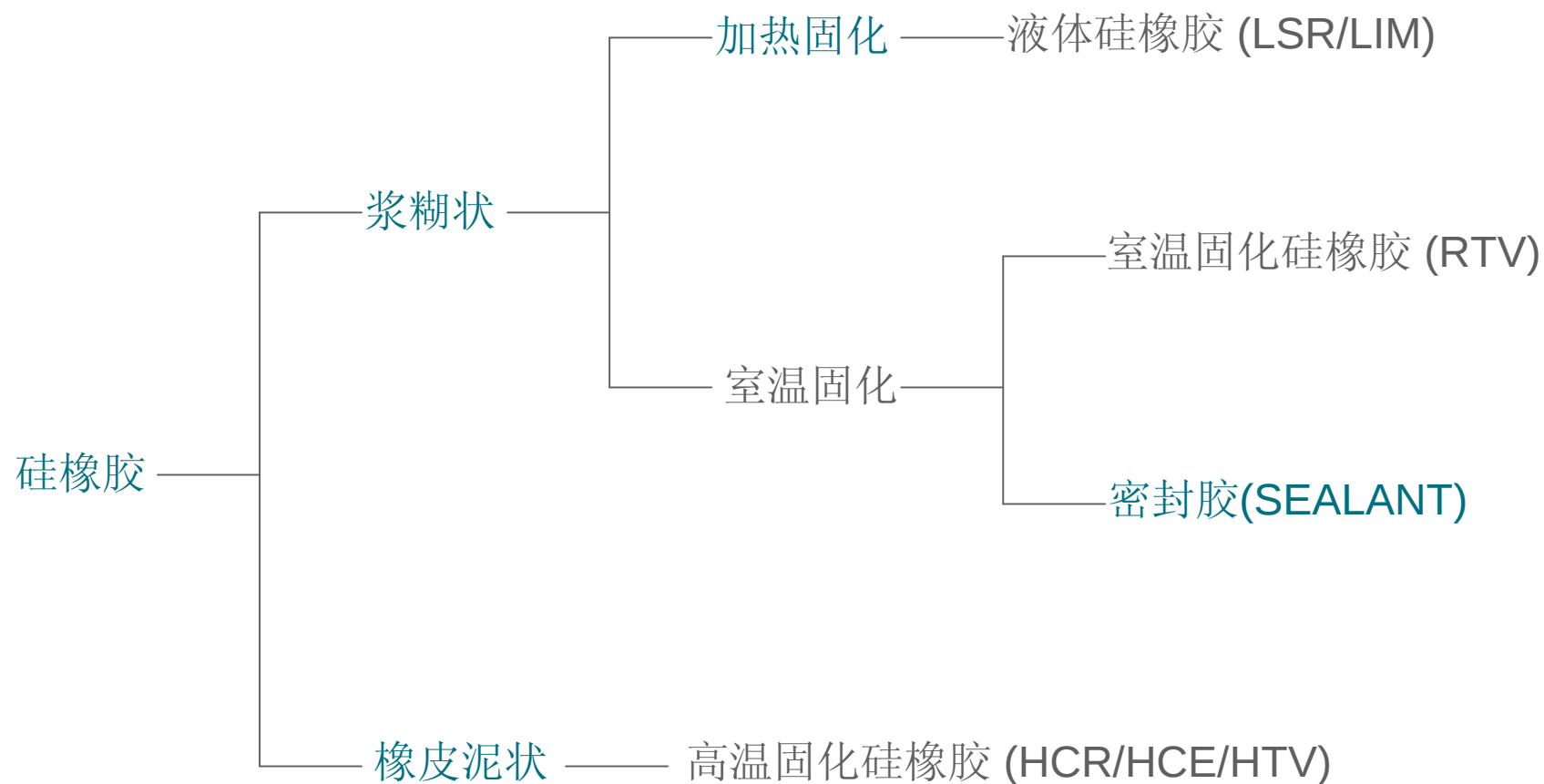


多交联有机聚硅氧烷弹性固体

硅橡胶的合成



硅橡胶的分类



高温胶的典型组成

- 单组份
- 主体聚合物: 甲基乙烯基硅生胶,
 $\text{ViMe}_2\text{SiO}(\text{Me}_2\text{SiO})_n(\text{MeViSiO})_m\text{SiMe}_2\text{Vi}$,
 $n+m = 3,000 \sim 10,000$
- 填料: 白炭黑
- 催化剂: 有机过氧化物
- 各种添加剂

液体胶的典型组成

A组份

- 主体聚合物: 乙烯基封端硅油,
 $\text{ViMe}_2\text{SiO}(\text{Me}_2\text{SiO})_n\text{SiMe}_2\text{Vi}$,
 $n = 200 \sim 1,500$
- 填料: 白炭黑
- 催化剂: 铂化合物
- 各种添加剂

B组份

- 主体聚合物: 乙烯基封端硅油,
 $\text{ViMe}_2\text{SiO}(\text{Me}_2\text{SiO})_n\text{SiMe}_2\text{Vi}$,
 $n = 200 \sim 1,500$
- 填料: 白炭黑
- 交联剂: 含氢硅油, $-(\text{Me}_2\text{SiO})_n(\text{MeHSiO-})_m$
- 阻聚剂: 铂毒化剂
- 各种添加剂

硅橡胶的优点

- 耐高温(可连续使用**200°C**)
- 耐低温(保持弹性**-50°C**)
- 物理特性稳定(温度变化影响小)
- 电气特性稳定(温度变化影响小)
- 阻燃性能好
- 耐臭氧, 紫外线, 和气候
- 低**永久**压缩变形
- 耐极性溶剂以及优秀的憎水性
- 耐水蒸气(可在**120°C**下连续工作)
- 很好的透气性
- 加工简易

硅橡胶的缺点

- 价格昂贵
- 物理强度较差(与合成橡胶相比)
- 液体溶胀(非极性溶剂,遇强酸和强碱解聚)
- 耐蒸气性差(遇到**150°C**的水蒸气会解聚)
- 密封性差(透气性好)
- 难粘接
- 线收缩率较高

高温胶的交联(自由基机理)

- 过氧化物酰类



加热

热空气硫化用(TC-12)
分解温度100-120°C
副产物较难除去

- 过氧化物烷类

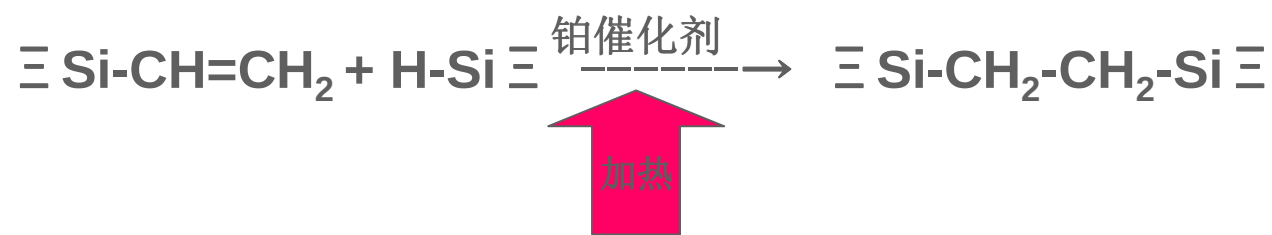


加热

模压成型用(TC-8)
分解温度160-180°C
副产物易除去
O₂阻止交联(不能用于热空气硫化)

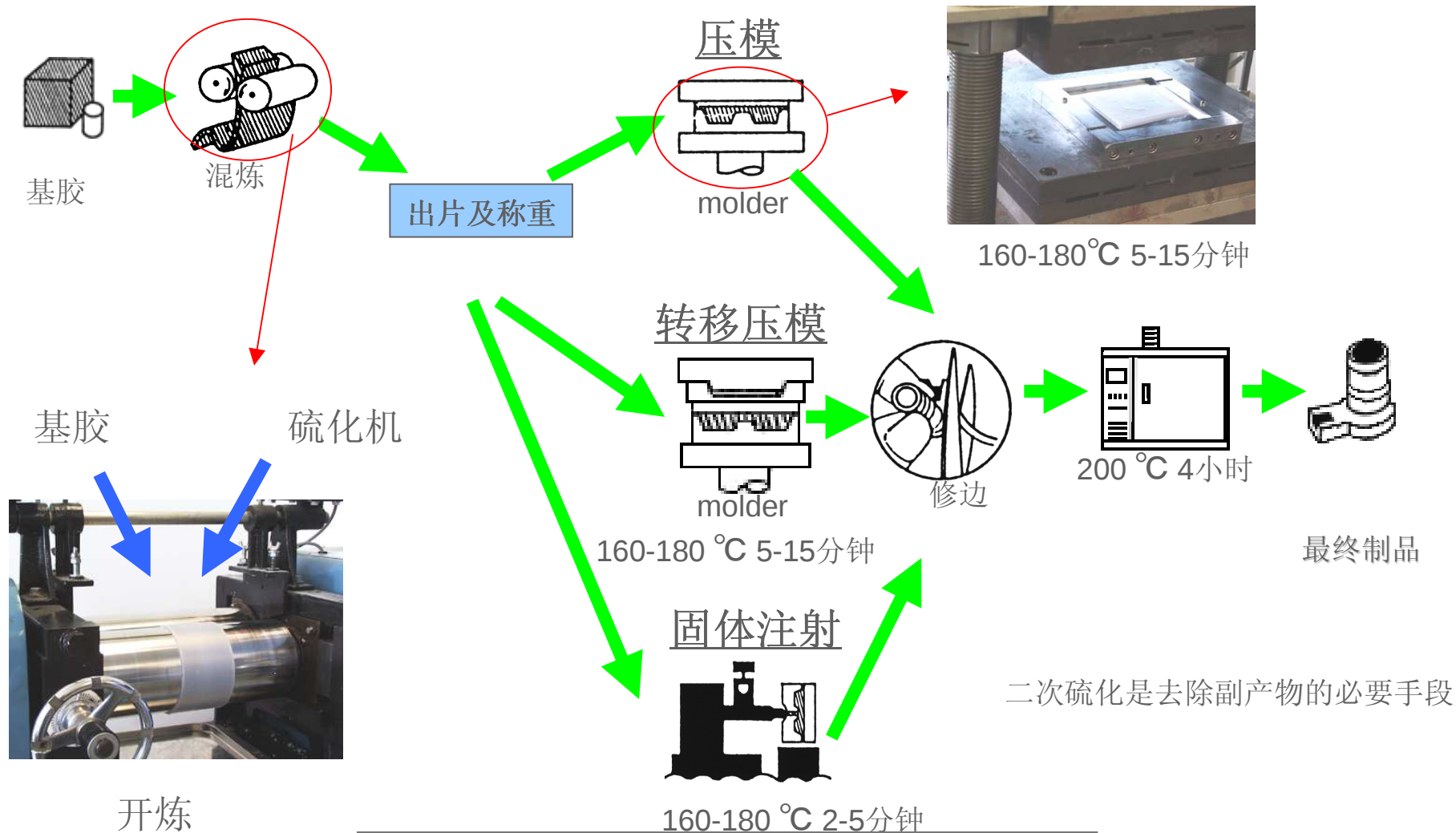
- 硫化温度必须高于分解温度
- 二次硫化是去除副产物的关键

液体胶的交联(加成机理)



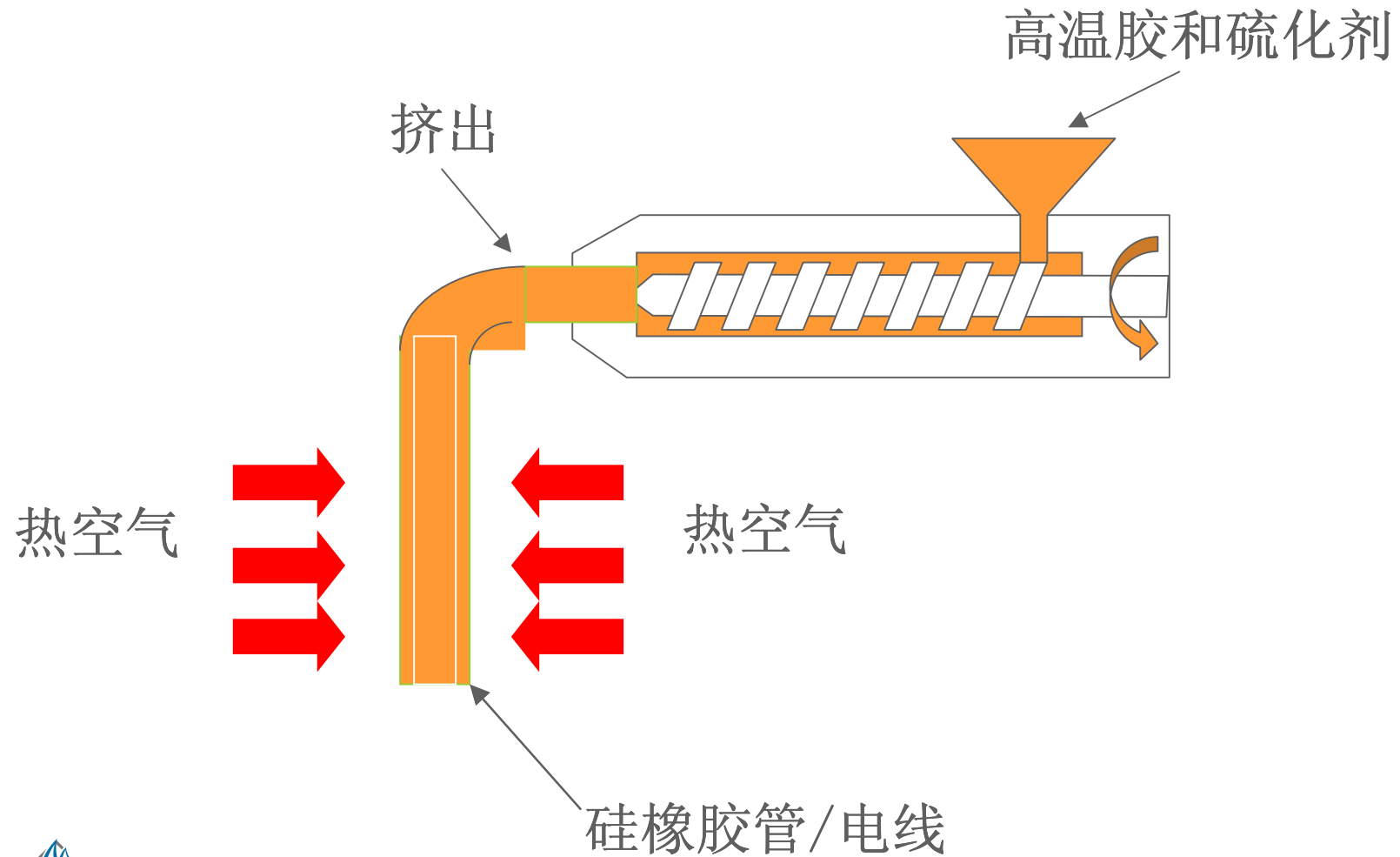
- 无副产物
- 温度促进硫化速度
- 铂遇到硫化物, 氮化物, 有机金属物, 磷化物, 有机橡胶, 缩合型硅橡胶, 矿物油, 油脂, 蜡, 防锈剂等会失去活性

高温胶的加工成形方法—模压

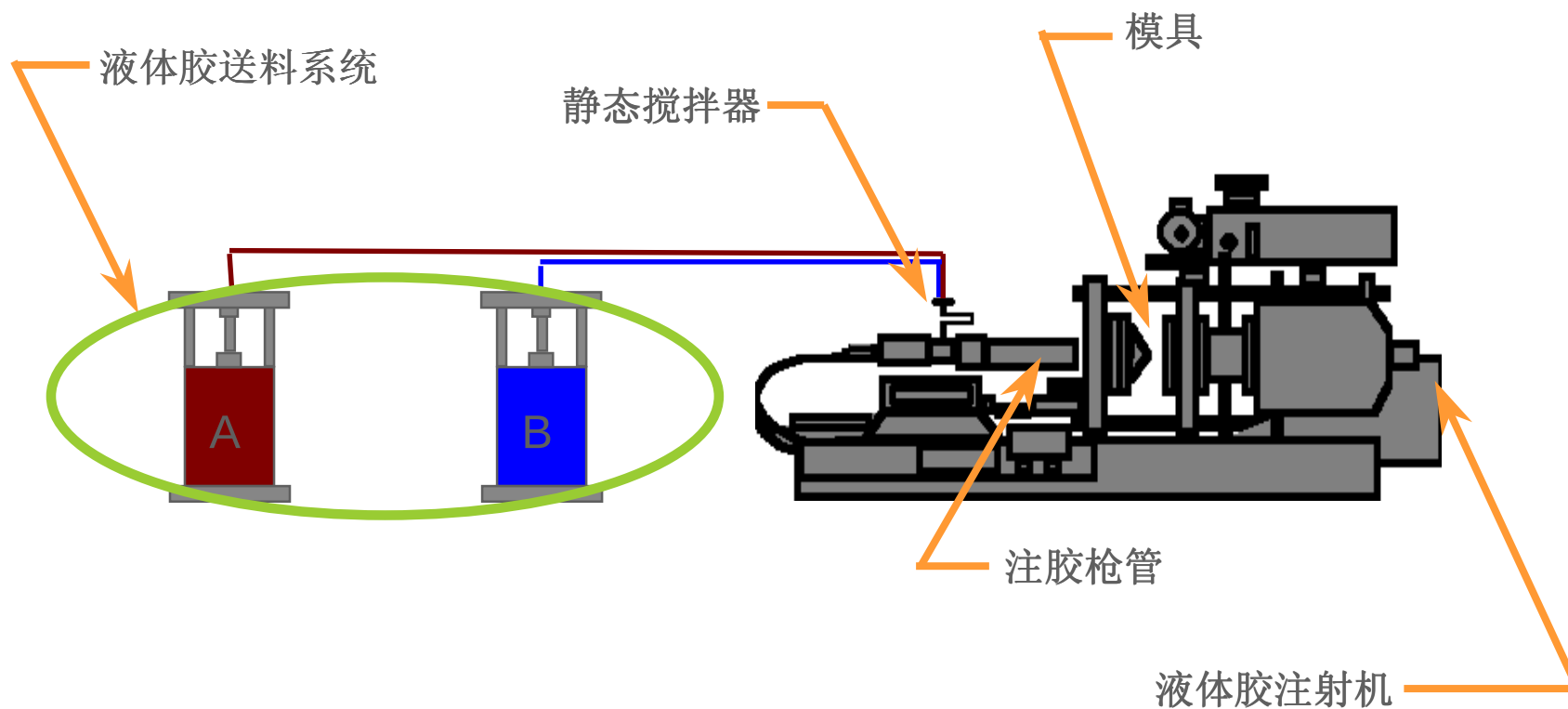


固体胶注射方式可以有较高的效率

高温胶的加工成形方法—挤出

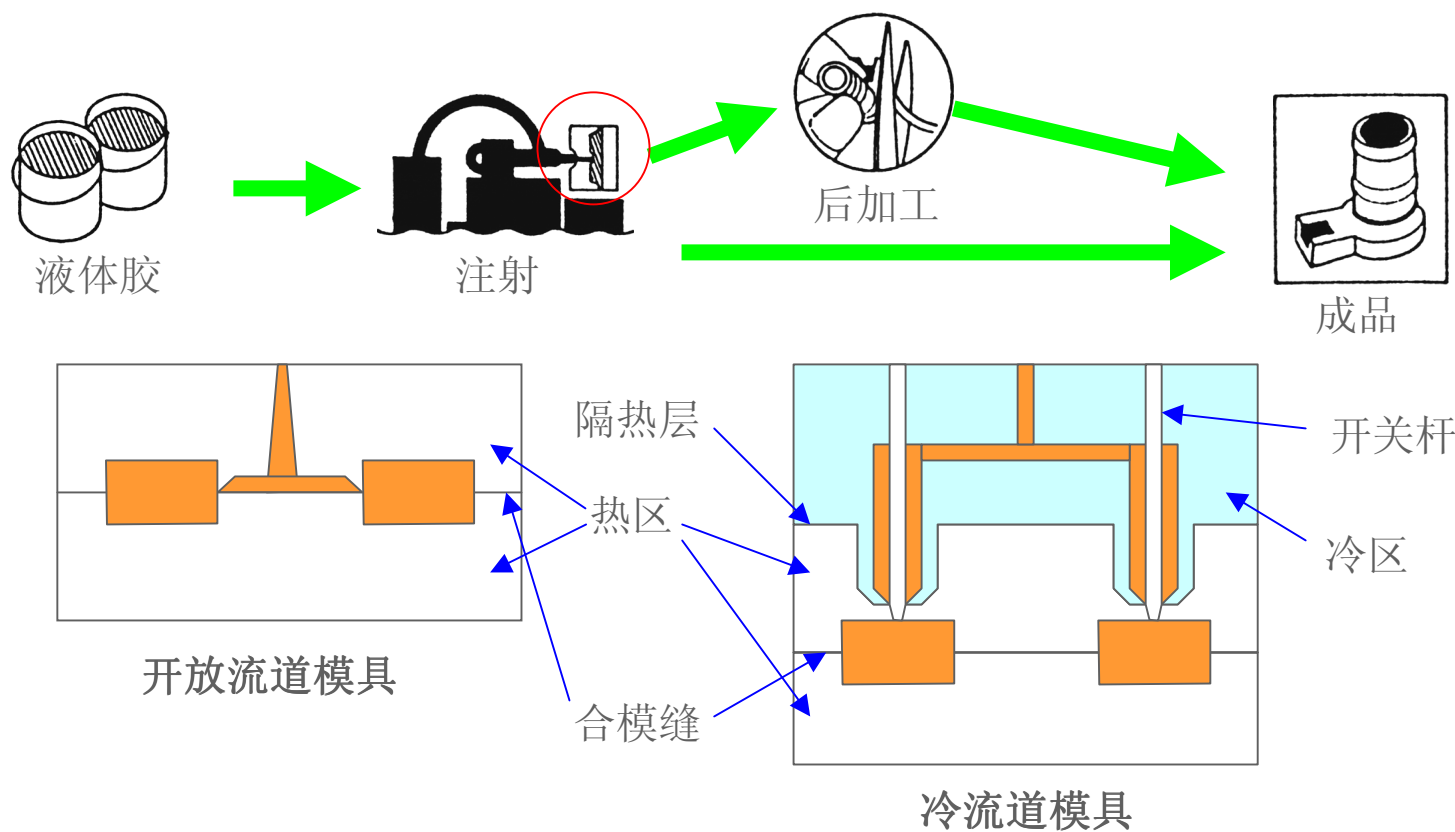


液体胶的加工成形方法—注射



用于小制件的生产, 一模多件, 一次射出量少.

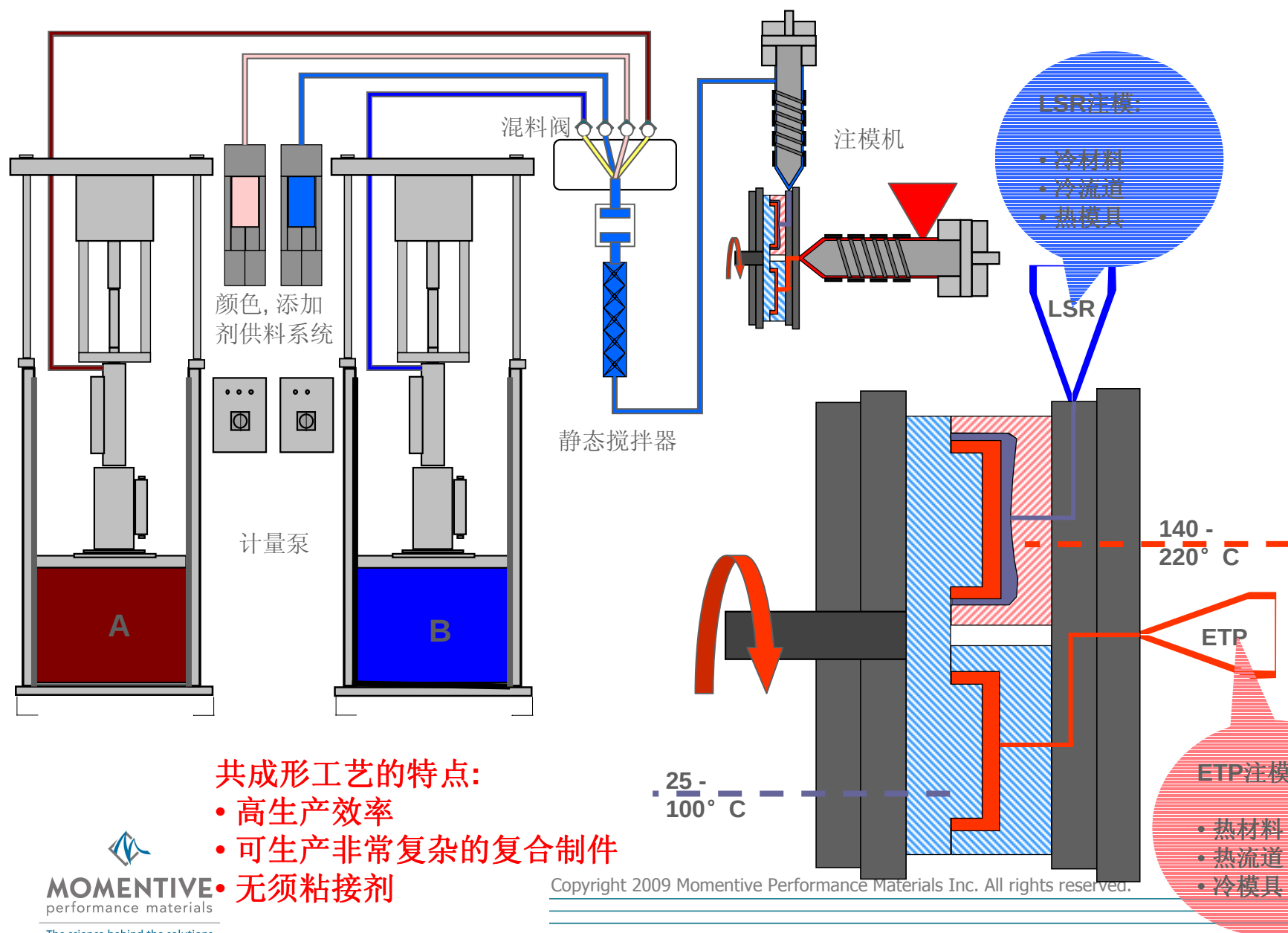
冷流道模具



冷流道模具的特点:

- 无材料浪费
- 无须清理流道
- 无须修费边

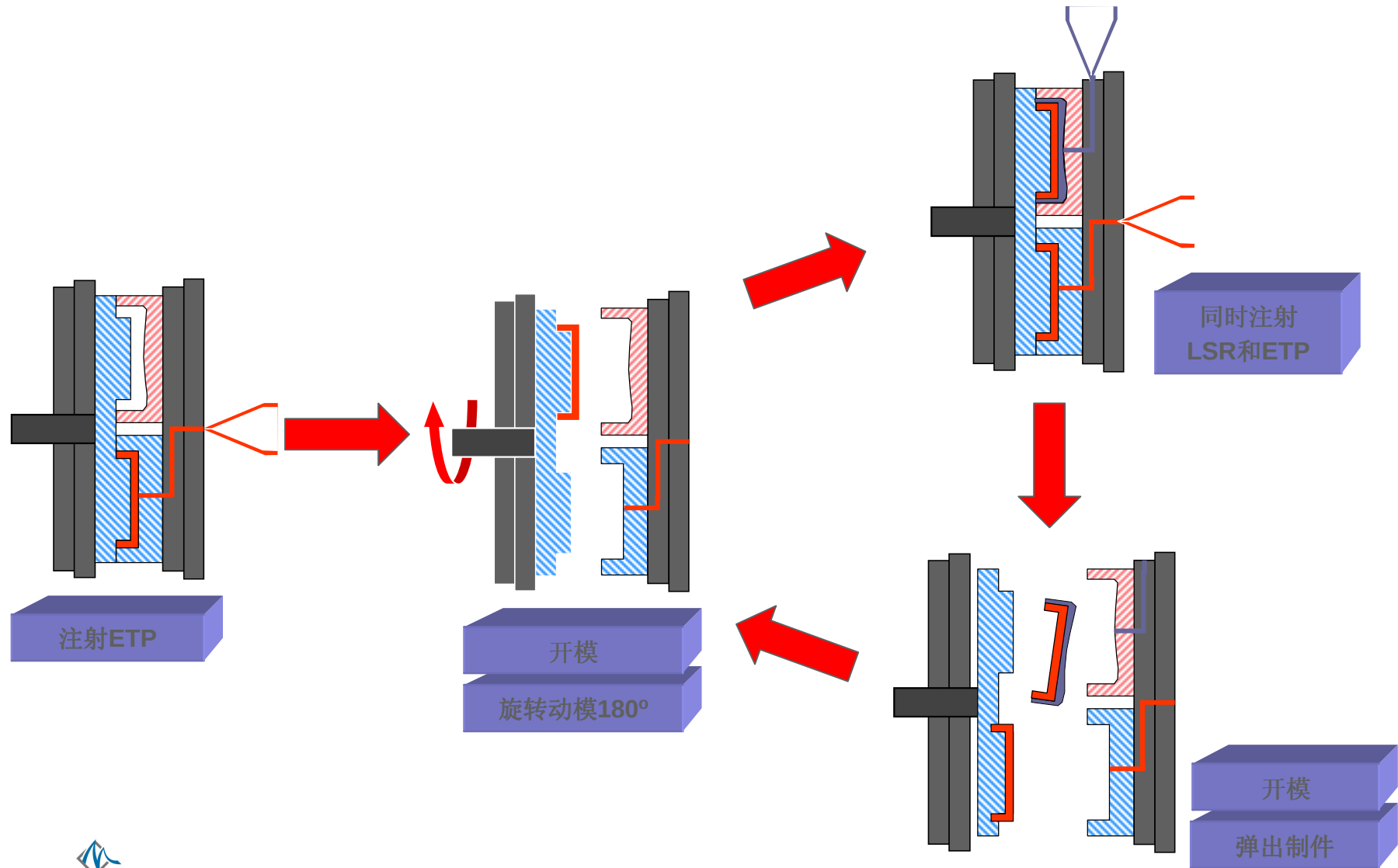
自粘接硅橡胶和塑料两步共成形工艺



共成形工艺的特点:

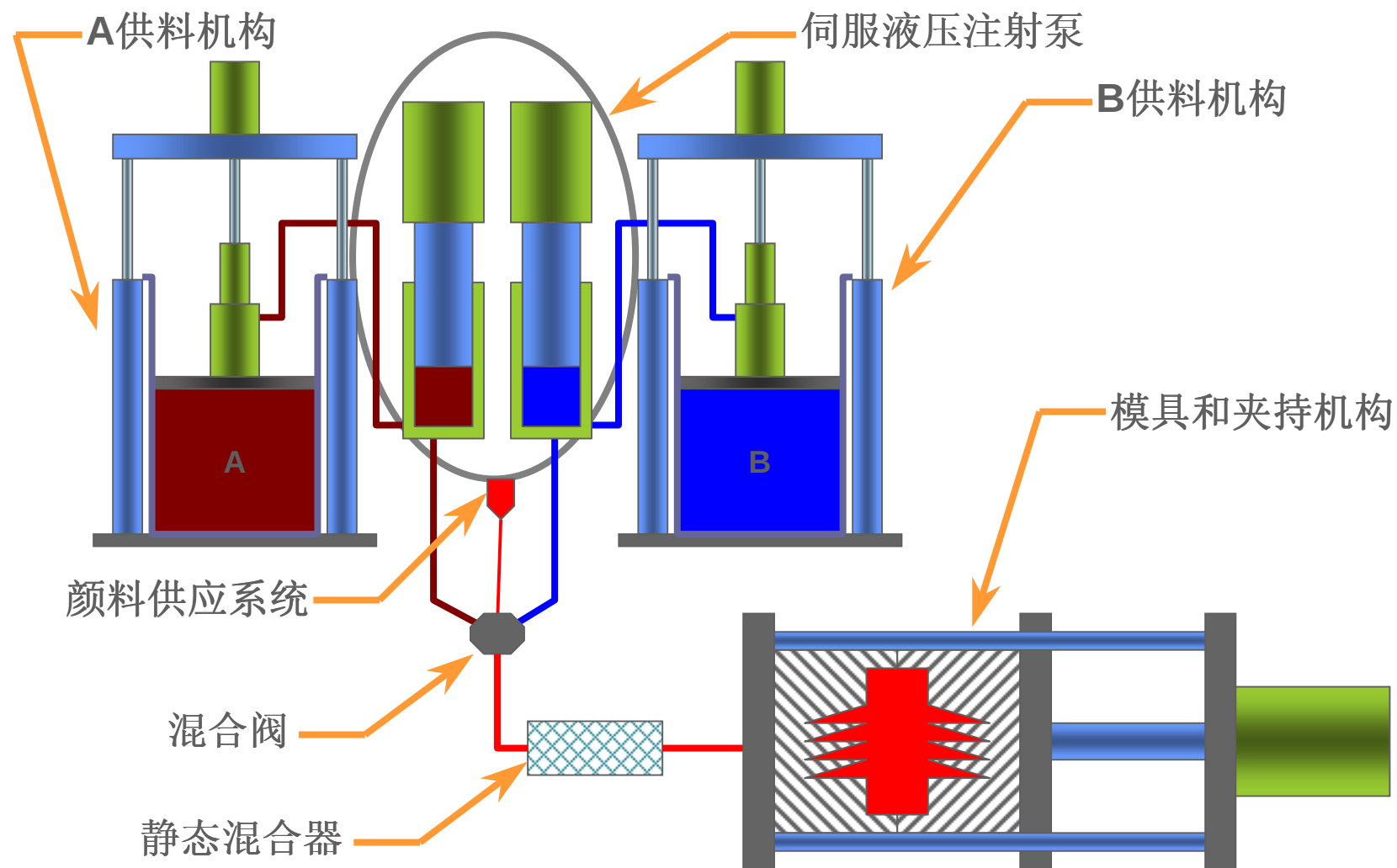
- 高生产效率
- 可生产非常复杂的复合制件
- 无须粘接剂

两步共成形加工循环



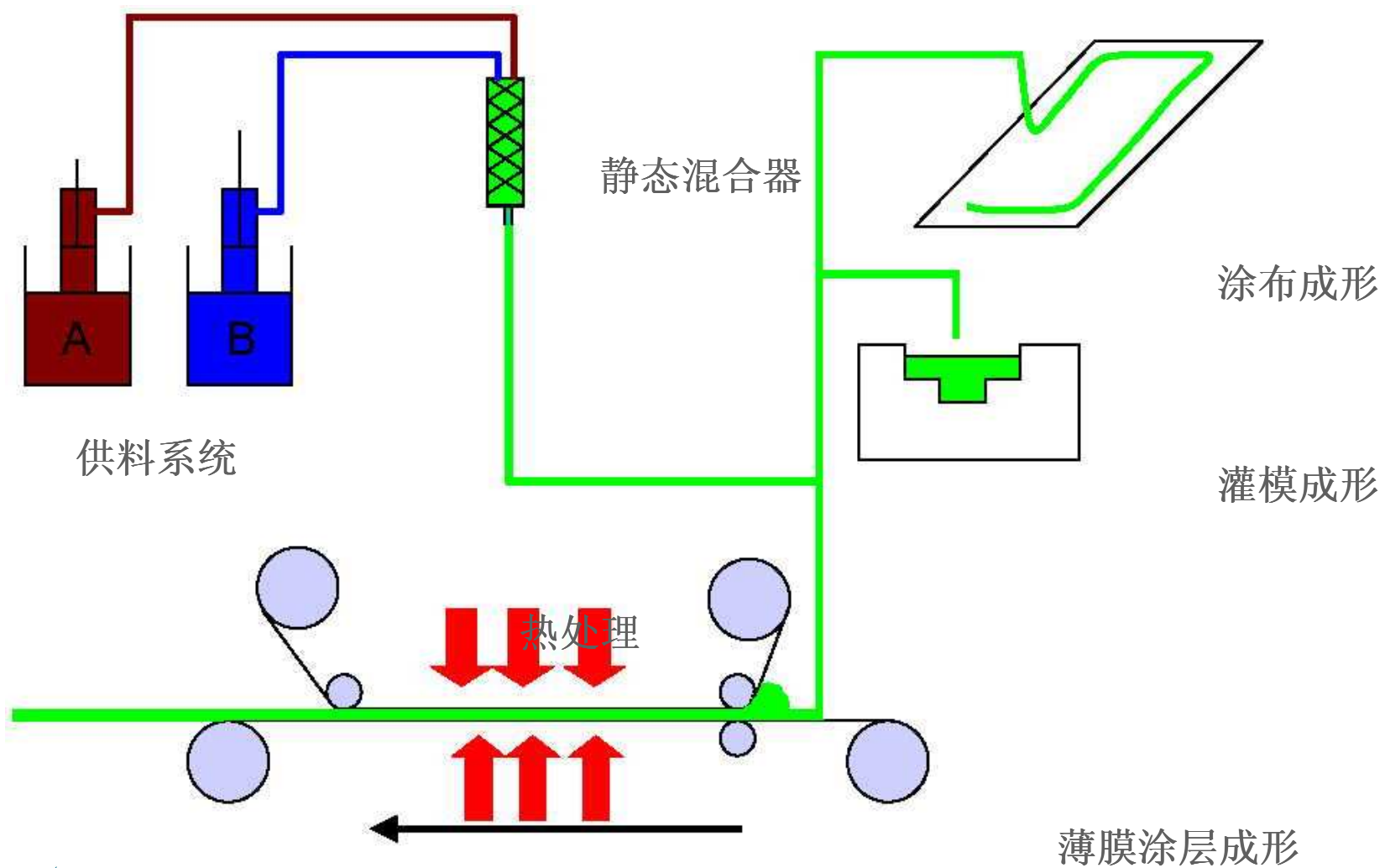
自粘接硅橡胶的适用基材

表面基材	粘接度
PPO / PA (Noryl GTX)	优秀
PBT (Valox)	优秀
PPA (Amodel)	优秀
PPO (Noryl)	良好
PA (Nylon 6 - Glass-Filled)	良好
ABS (Cycolac)	一般
PPS (Supec)	临界
PC (Lexan)	不佳
PC (UV pre-treated)	优秀
PC / ABS (Cycloy)	一般
PC / ABS (UV pre-treated)	优秀
Aluminum	优秀
Steel (Carbon, Stainless)	优秀
Steel (Galvanized)	临界



用于大制件的生产，一模一件，一次射出量多。

液体胶的加工成形方法—其它



液体胶与高温胶的综合比较

液体胶

设备投资大

自动化生产程度高

无需成形前加工

成形温度低 (**100-180 °C**)

固化速度快 (小于**1分钟**)

生产周期短 (**2-5分钟**)

理论上无副产物

脱模性好

无或少废边/产率高

一般不需二次热处理

***不适于生产电线电缆和管件**

高温胶

设备投资小

自动化生产程度相对低

成形前需人工塑化, 加颜料和催化剂, 或压片

成形温度高 (**160-180 °C**)

固化速度慢 (**2-3分钟**)

生产周期长 (**5-15分钟**)

有副产物

脱模性相对较差

有废边/产率低

一般需二次热处理

***不适于生产形状复杂的或大型的制件**

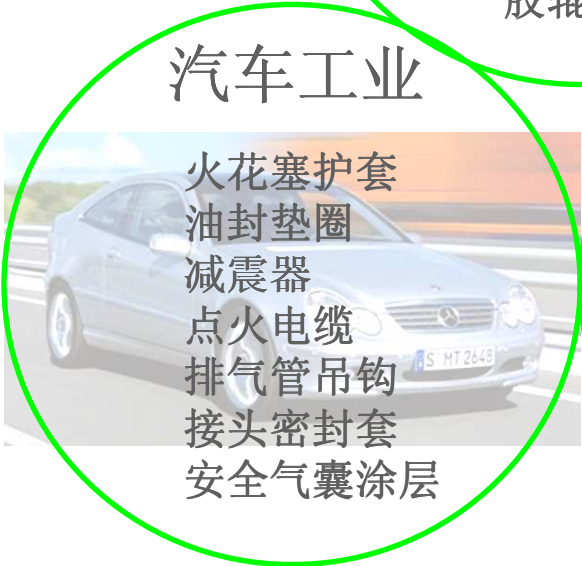
液体胶生产效率高, 成本较低

电子电力



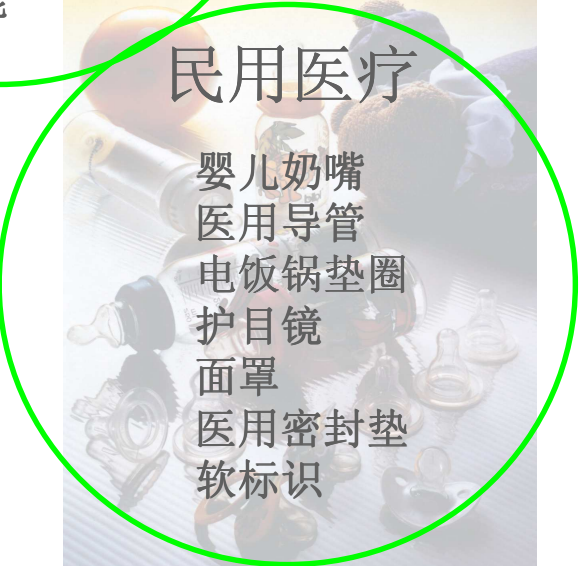
避雷器
绝缘子
阳极帽
按键
电线
中空套管
胶辊

汽车工业



火花塞护套
油封垫圈
减震器
点火电缆
排气管吊钩
接头密封套
安全气囊涂层

民用医疗

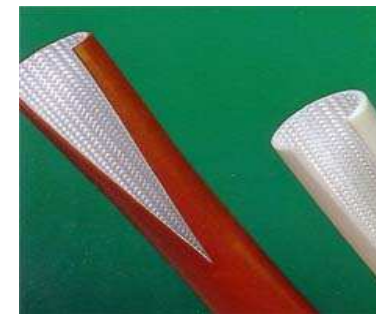


婴儿奶嘴
医用导管
电饭锅垫圈
护目镜
面罩
医用密封垫
软标识

电线电缆

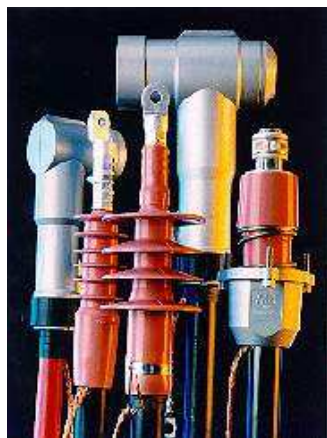
- 电线电缆
- 电绝缘管材
- 玻纤加强层护套

HV2/2160, HV2/2170
TSE2523U/2527U
SE6035+SE6075
TSE2425U/TSE2641U
XE15-Bxxxx, SE6250

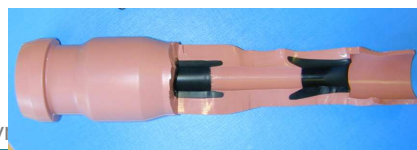


高压输变电

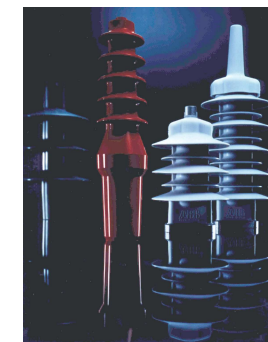
- 避雷器
- 套管
- 互感器
- 复合绝缘子
- 电缆终端
- 应力控制部件



Copy



eria



电子电气

- 阳极帽
- 按键
- 胶棍
- 电子杂件
- 隔膜
- 抛光机减震装置

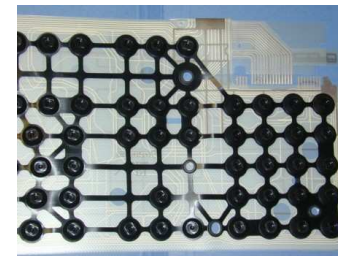
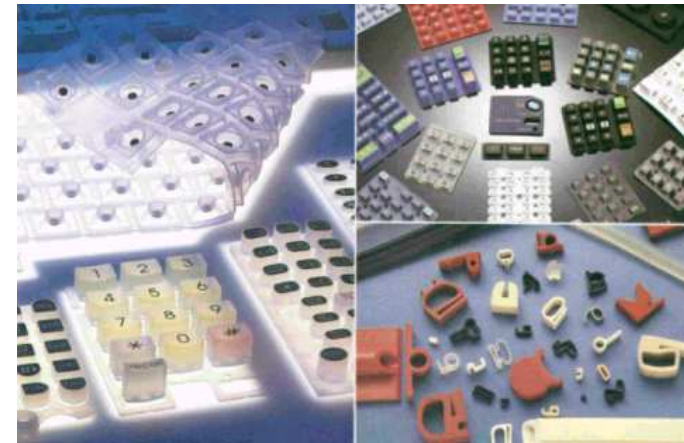
LSR2400, LSR2740

TSE221xU, TSE218xU

LSR 2255, LSR20x0

XE15-Bxxxx, LSR2841

TSE270-xU, TSE22x7U



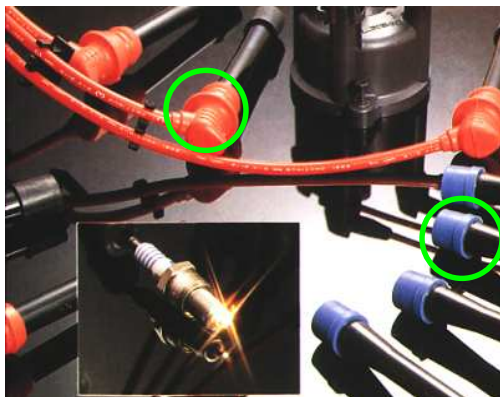
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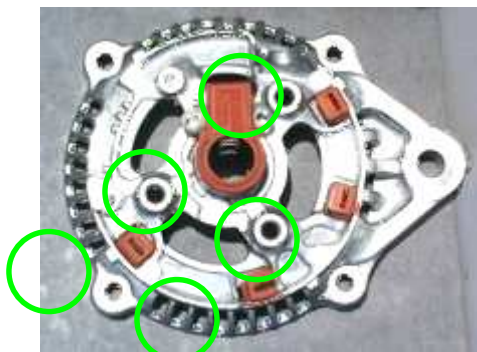
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- 火花塞护套
- 点火线缆
- 滤油器检验阀
- 发电机电极帽



TSE221-xU, LIM102x
LSR26x0, LSR20x0
FSL 7586/40
AC 160 SPB



接头垫圈



- O型圈, 联接件封套 XE20-53xU, LSR3485, LSR33xx/xx

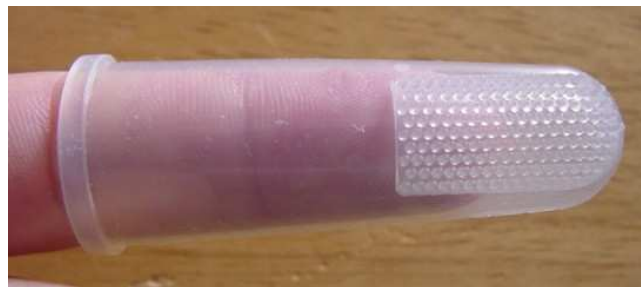
母婴用品



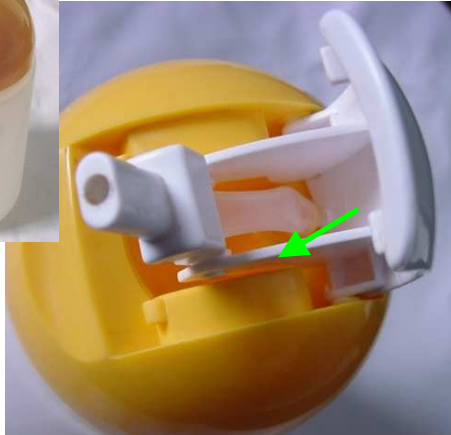
- 奶嘴
- 婴儿安抚器
- 护乳垫
- 婴儿牙刷
- 吸奶器
- 吸杯阀门



LSR20x0, LSR26x0
LSR2940, LIM60xx
TSE260-xU, HV1/x01
HV3/x22, HV4/x11



幼儿用品



- 幼儿水杯吸管
- 幼儿水杯密封
- 鞋垫
- 扭扣
- 把手吸盘



LSR20x0, LSR26x0
LSR2940, LIM6071
Tufel II 94705, HV1/x01
HV3/x22, HV4/x11
TSE257x-5U, TSE252xU
TSE221-xU, TSE2627U



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- 导尿管
- 肠饲管
- 蠕动泵管
- 其它管件



LSR40X0 HV 4/x11, 3/x22
Tufel II 94x06, SE4524U



输液器件



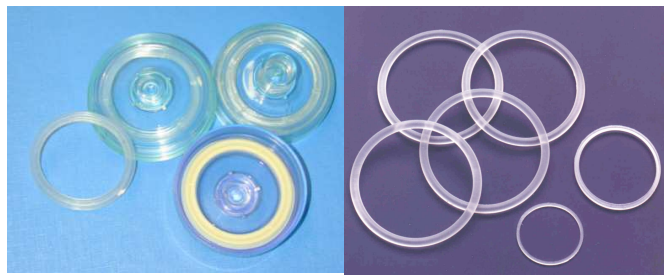
- 肠饲器件
- 输血器件
- 输药器件
- 导尿器件
- 无针阀



LSR40x0, LSR26x0
Tufel II 94x05, LIM60xx
TSE252x, TSE262x
SE603x, SE63x0



医用杂件



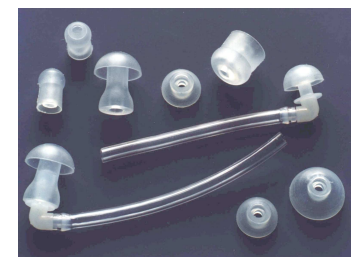
- 呼吸面罩
- 药瓶塞
- 磁疗垫
- 护趾套
- 助听器部件
- 渗析用O形垫圈



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LSR26x0, LSR20x0
LSR40x0, Tufel II 94x05
LIM60xx, LIM8040
XE15-B9186, XE15-C0092



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