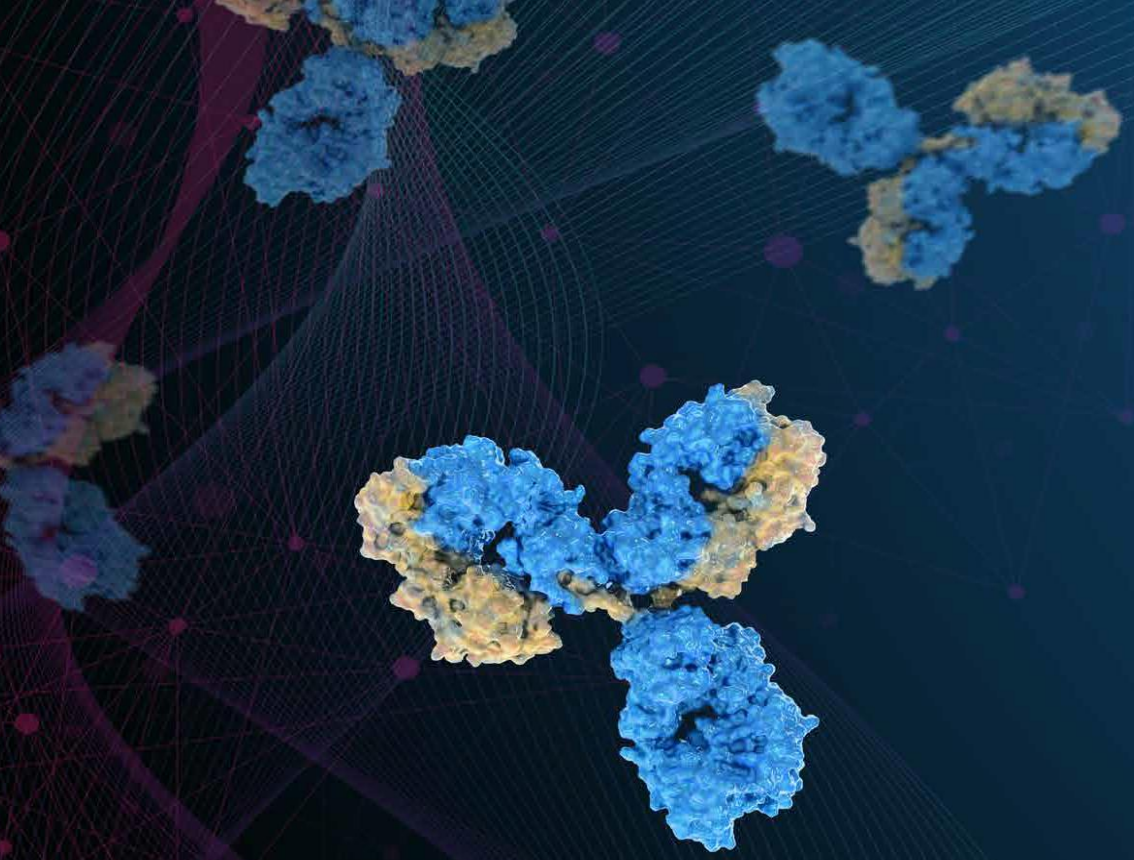


TURGUT PHARMACEUTICALS®

Turgut Pharmaceuticals

Company Presentation

TURGUT Corporate History

1959

FAKO İlaçları A.Ş. was established

1967

Licensing agreements with **American Home Products** and **Daiichi Pharmaceuticals Co.**

1971

Levent Production Plant was completed

1973

Licensing agreement with **Chemie-Linz Nycomed**

1974

Turkish subsidiary of **Abbott** was acquired by **FAKO**

1975

First Ampicillin production Plant in Turkey was completed

1976

Turkish subsidiary of **Squibb** was acquired by **FAKO**

1978

TURGUT Holding was established

1981

Licensing agreement with **Smith Kline&French**

Licensing agreement with **Mallinkrodt USA**

Licensing agreement with **MSD**

TURGUT Corporate History

1982

Ayazağa API production plant was completed

1992

Licensing agreement with **Procter & Gamble** and **Max Factor**

1993

Co-Marketing agreement with **Smith, Kline & French**

1995

Turkish subsidiary of **SQUIBB** was acquired by **FAKO**

2000

First **SAP** system applications in Turkey at **FAKO** production plants

2001

UK Health Authority **MCI** (MHRA) approval for **FAKO** production plant

2004

FDA approval for **FAKO** API production plant

2006

FAKO sold the generic business to **ACTAVIS**

2008

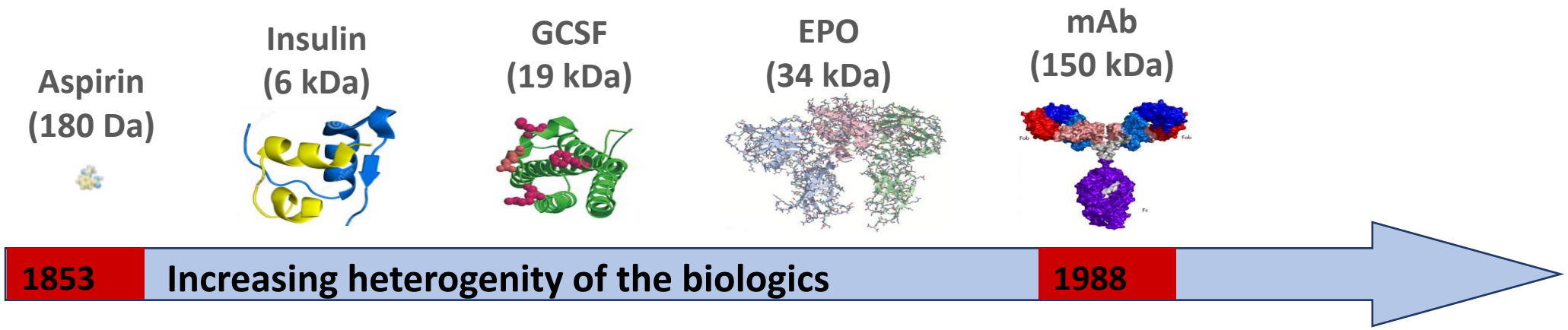
Restructuring under the name of **TURGUT İlaçları A.Ş.**

2014

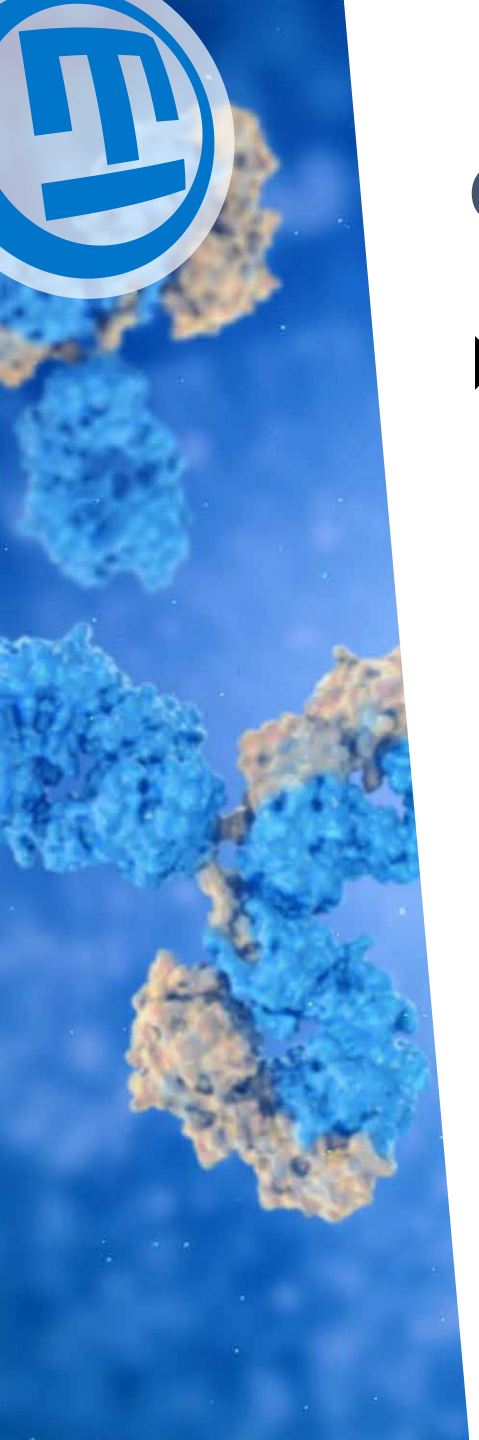
TURGUT established its R&D Labs

TURGUT Biotechnology Group was established

Turgut's Strategy



- To develop, produce and license highly biosimilar products according to the TITCK, FDA and EMA regulations
- To aim a biosimilar candidate which is 'highly similar' to the originator reference product in terms of safety, efficacy and immunogenicity
- To expand our market size and area through out-licensing our biosimilar products and in-licensing both small molecules and biologics



GMP Production Plant

- GMP complied facilities
  - Multi-product mammalian cell culture GMP plant (2x200 L and 2x2000 L)
  - Fill & Finish Facility
  - Quality Control Laboratories
  - Storage rooms, offices and social facilities

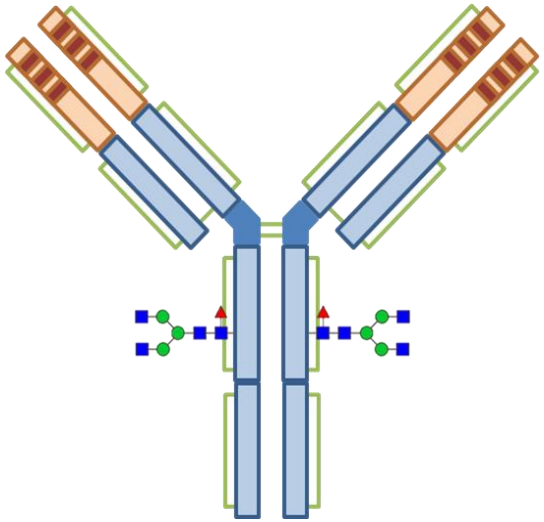
GMP Production Plant

Our facility has acquired from Turkish Authorities

- GMP Facility Certificate in February 2021,
- GMP Biosimilar mAb Production Certificate in March 2021,
- GMP Vaccine Certificate in March 2021 and
- Covid-19 Safe Production Certificate from TSE (Turkish Standards Institution) in March 2021.
- GMP Audit for Sterile Fill & Finish Facility is ongoing this week

Turgut Gebze Biopharmaceutical Manufacturing Site

Biotechnological Capabilities



- Cell Line and Media Selection
- Uptream & Downstream Process Development
- Analytical Method Development & Validation
- Scale-Up Capabilities
- Phase I
- Process Validation
- DS Production & Comparability

Single Use Production Systems

200L Bioreactor

Clarification

Chromatography System

Virus Filtration System

TFF System

Single Use Buffer Preparation System

MERCK

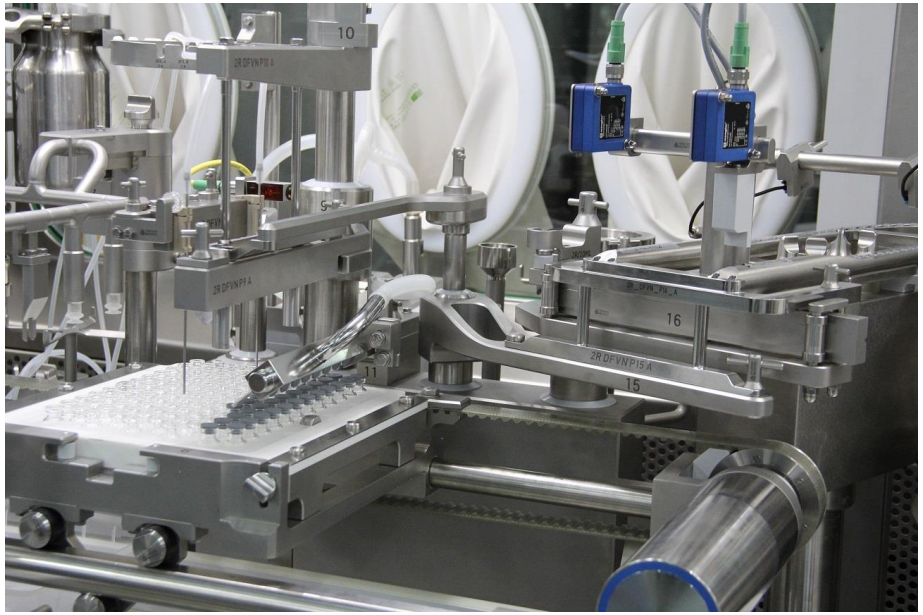
State of the Art Quality Control Laboratories

Mass Spectrometry Xevo G2-XS QToF	UPLC-UV H-Class Bio	UHPLC Arc-Bio	Capillary Electrophoresis PA800 Plus	Capillary Electrophoresis ICE3	Appearance MIH-LX
					

SPR Biacore T200	Spectrophotometer Spektramaxi3x	RT-PCR Quantstudio 5	HIAC 9703+	Calorimeter	UV 280 SoloVPE	UV 280 Nanodrop One
						
				Turbidimeter		
						

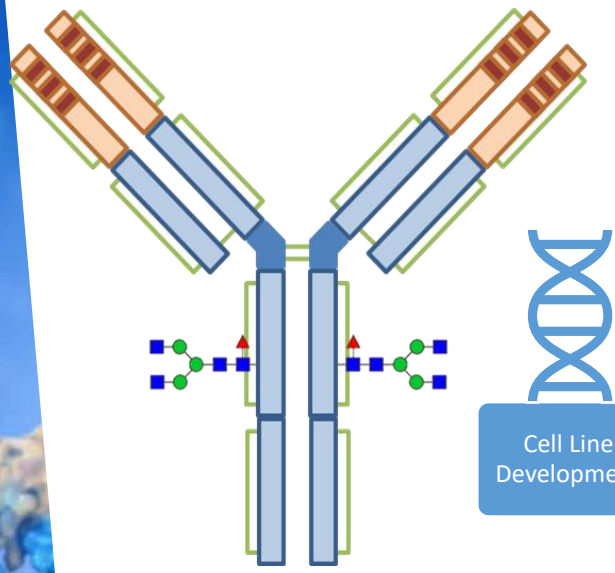
Fill & Finish Line: Groninger FlexPro Debagger – FlexPro Deliner

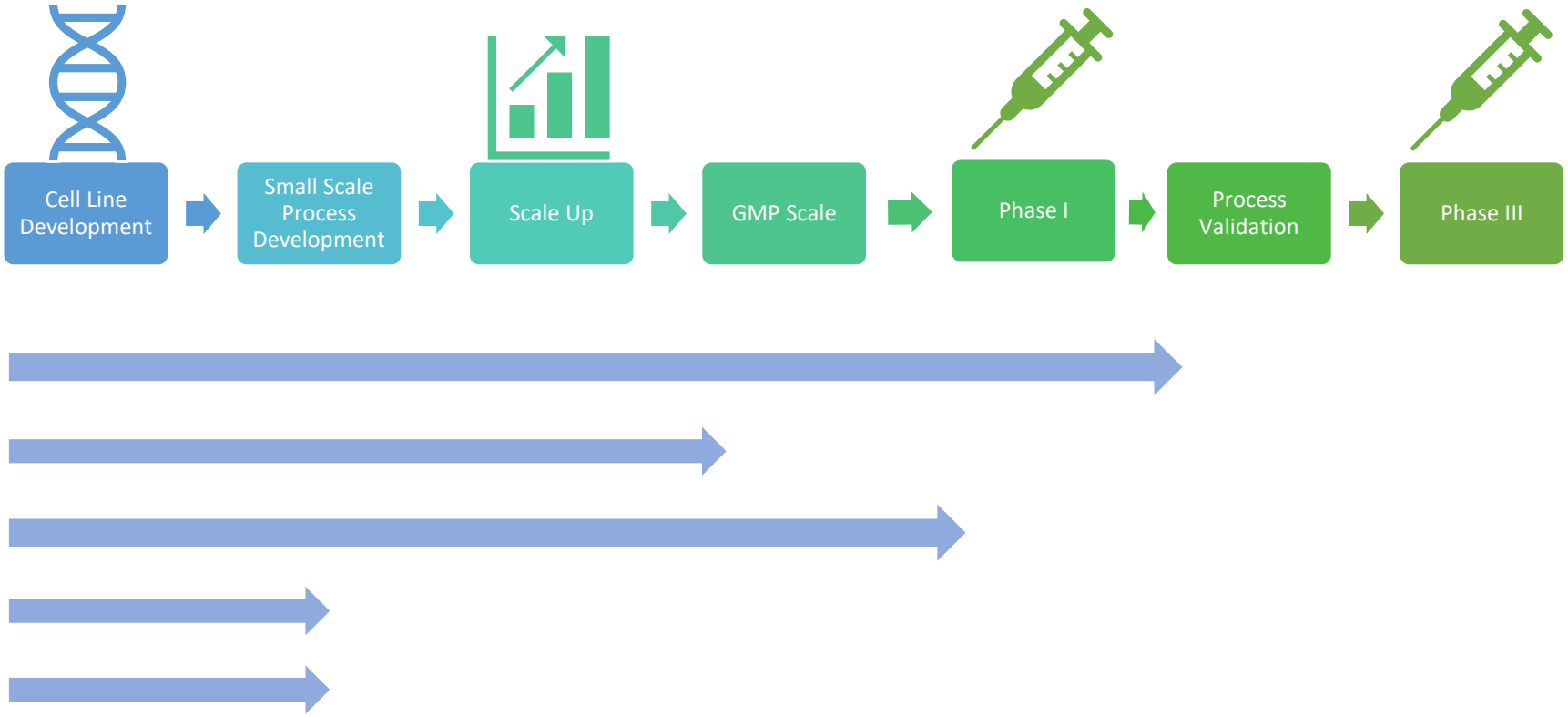
Fill & Finish Line: Groninger Filling and Stoppering

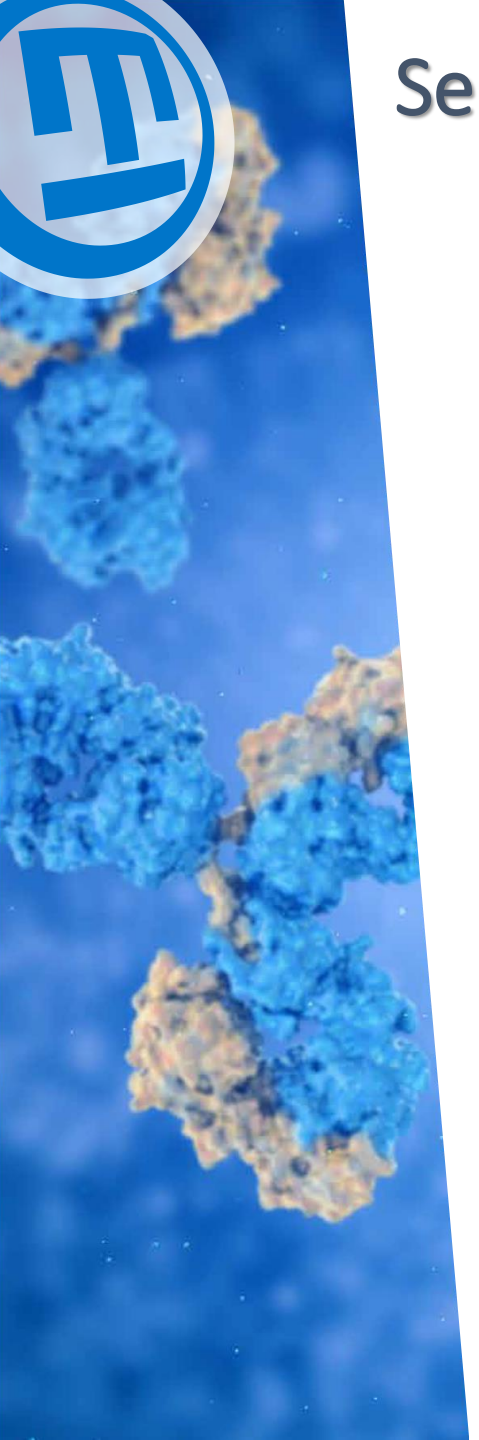


Fill & Finish Line: Groninger Capping Machine

Turgut's Current Biosimilar Pipeline



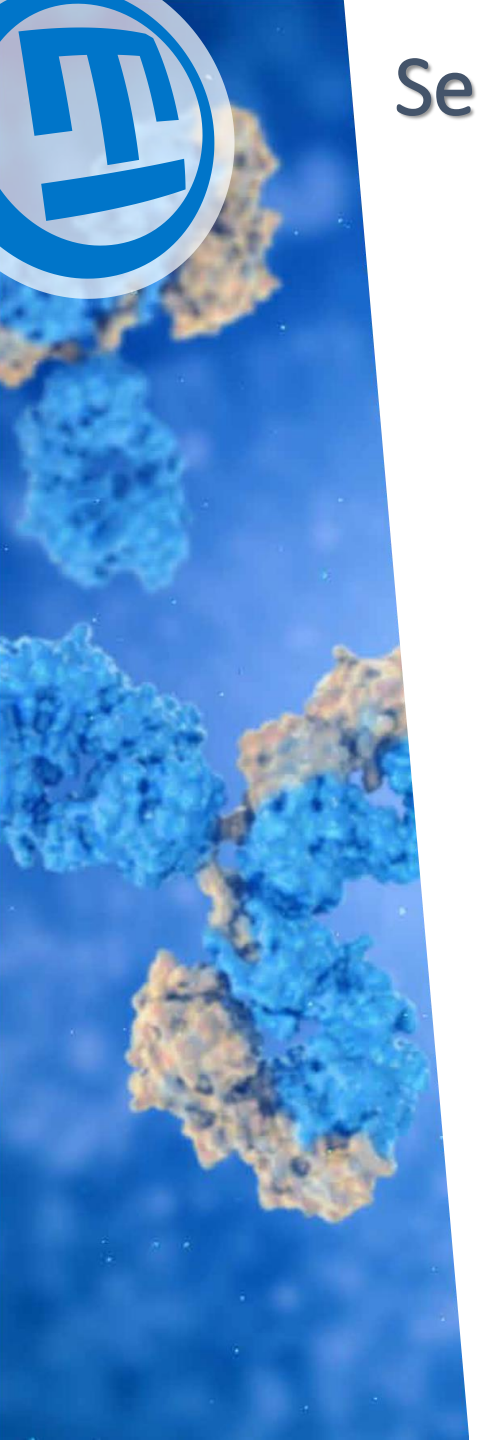




Services and Capabilities

mAb and recombinant protein development & manufacturing

- Industrial cell line development technology
- Fully equipped laboratory infrastructure capable of developing upstream and downstream processes for the production of high quality biosimilar mAbs
- Well-trained personnel capable of developing upstream and downstream processing for high-quality biosimilar mAb production
- 2x200L large scale manufacturing capacity in single use bioreactors

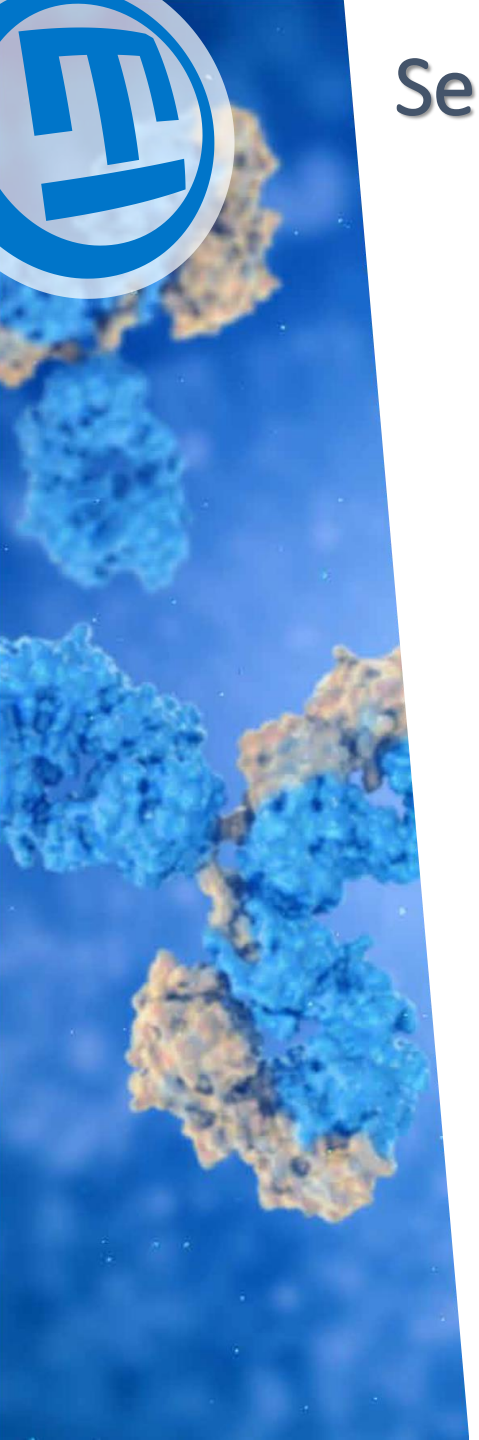


Services and Capabilities

State-of-the-art analytical capabilities

Comparative protein analysis technologies and methods according to EMA and FDA requirements:

- High-resolution mass spectrometry
- Label free biomolecular interaction (SPR)
- In-vitro cell-based assays
- Orthogonal purity/impurity analysis
- Pharmacopeia methods for general analysis
- Microbiological safety analysis



Services and Capabilities

Sterile Filling

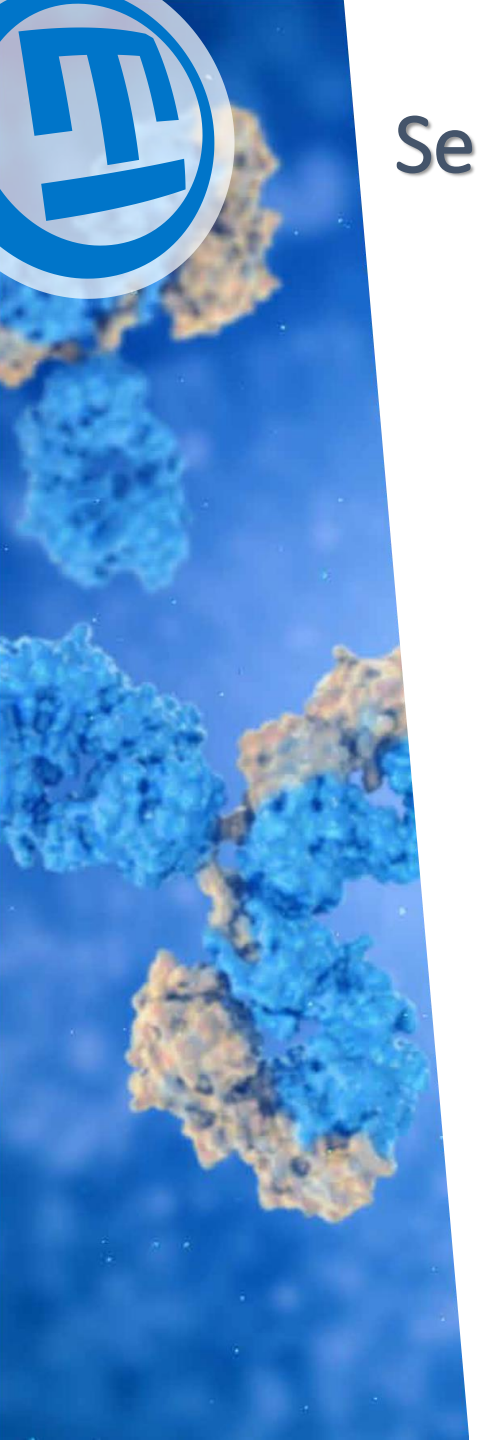
- Totally Single Use Based Biosimilar Filling Concept (Formulation=>Filling)
- Both Nested Syringe & Vial Filling in same Line
- Automatic Deliner Equipped Filling Line
- CFD Verified Filling & Capping Room Design
- mcHVLD IPC Container Closure Integrity Device
- European & Japanese Pharmacopeia Comply Visual Inspection Tables
- Ionized Hydrogen Peroxide Fumigation System

Capacity

1ml Long Syringe: 3000 syringes/h - 10mio syringes/year

6R Vial: 1400 vials /h - 5mio vials/year

20R/30R Vial: 500 vials /h - 2mio vials/year



Services and Capabilities

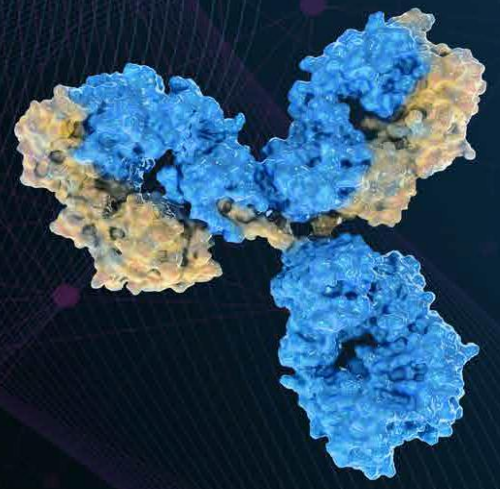
Small Molecules

Turgut Pharmaceuticals in-licenses high technology small molecules indicated basically in oncology and haematology therapeutic areas.

Turgut Pharmaceuticals is open to technology transfer and licensing opportunities for innovator and generic small molecules.

Turgut R&D Projects

- Certified R&D Laboratory since 2017
- In total 23 R&D Projects
- 15 of these has been comleted with success
- 8 projects are continuing
- All R&D projects have been prepared and followed-up with Etkin Proje consultancy
- In the annual top 250 R&D list in Turkey Turgut has been listed as
  - the 2nd pharmaceutical company, 30th among all companies
  - the 5th pharmaceutical company, 69th among all companies
  - Turgut is the first company in biotechnology area in Turkey in R&D projects



EURIPIDES²
Smart Electronic Systems

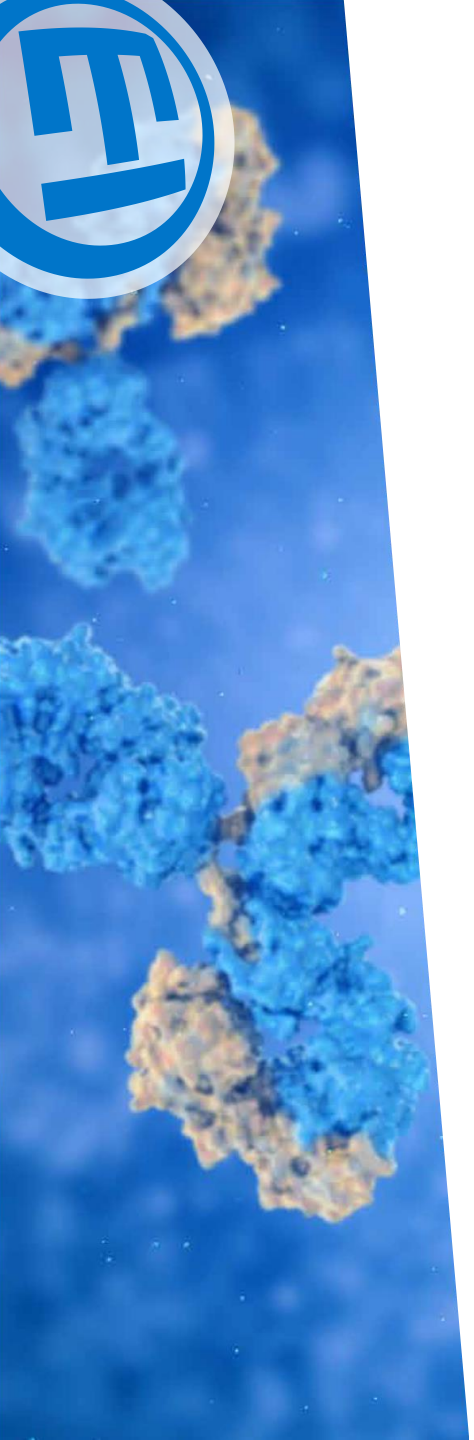
TURGUT PHARMACEUTICALS

ROBOTEK

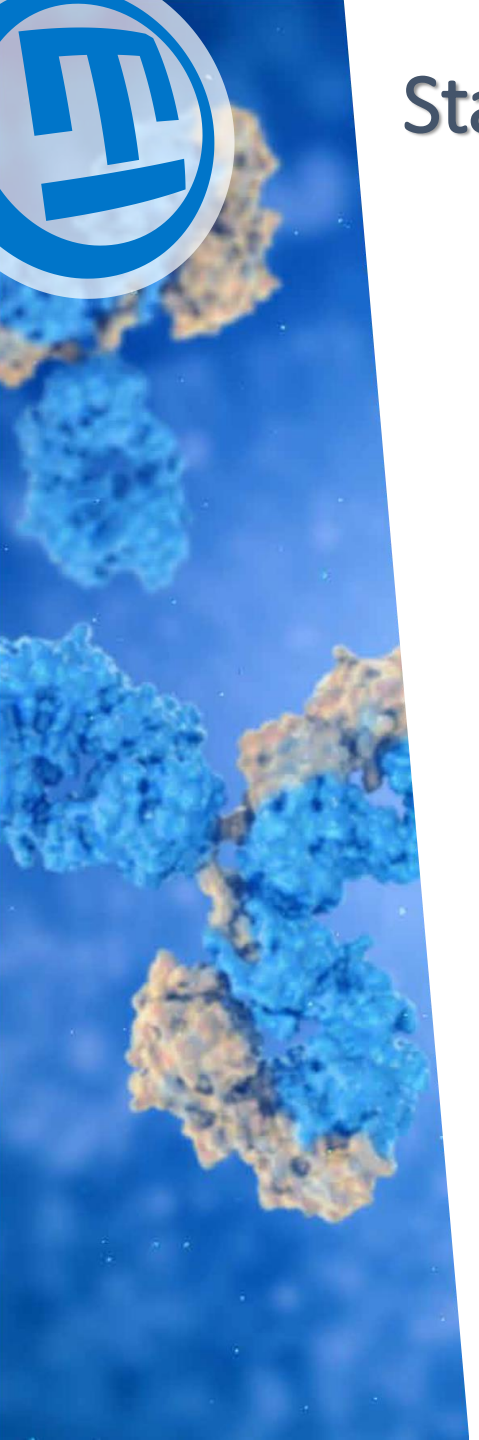
CENTI

BeyonDevices
SHAPING MEDICAL TECHNOLOGY

Sensing Robotics for Smarter Biotechnology (SR4SB)

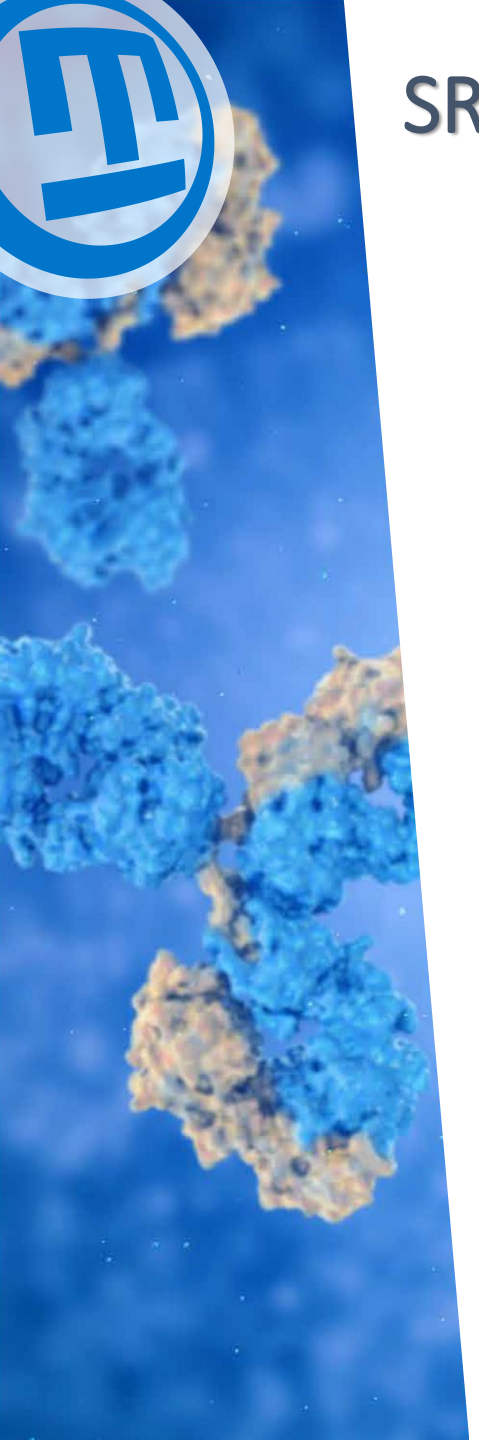



ΣURIPIDES²
2022 EURIPIDES²
Innovation Award
SR4SB



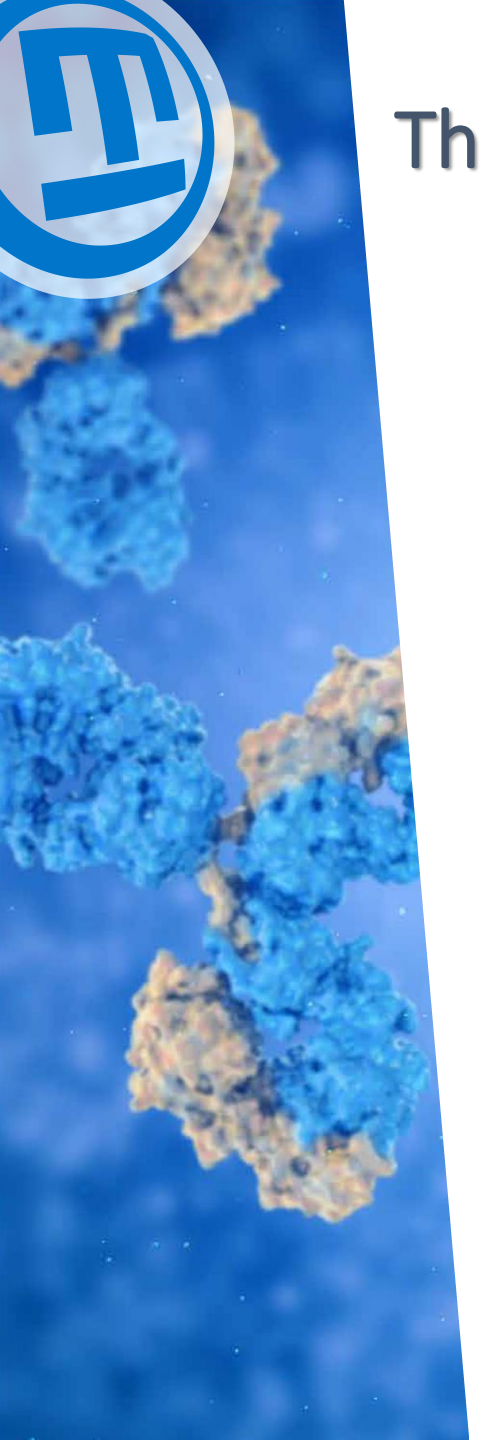
Starting Points of the Project Idea

- While the importance and commercial value of biotechnological drugs are increasing rapidly, one of the most important conditions for creating a competitive advantage in this expensive technology is the development of production methods that will enable the production of higher quality products at lower costs in a shorter time.
- The fact that the number of variables is high in biotechnological production method development studies, the necessity of making many trials while determining the ideal production conditions, the variability of the samples obtained in these trials for many reasons cause significant losses in terms of both time and cost in the industry.
- Well-designed robotic systems are needed to
  - eliminate these losses,
  - shorten production method development times,
  - increase quality and productivity,
  - and thus, reduce costs.



SR4SB Project Definition

- The consortium was combined of TURGUT Pharmaceuticals, Robotek, CeNTI and BeyonDevices.
- The geographical distribution of the partners includes Turkey and Portugal.
- The duration of the project was 36 months.
- The work plan consists of six work packages;
  - management,
  - system characterization and design,
  - sensors development and integration,
  - robotic development, implementation and testing and
  - dissemination and exploitation, respectively.
- The main foreseen market is biotechnology but there is opportunity to enlarge the exploitation to pharmaceutical and chemical analysis industries.
- Etkin Proje was the consultant of the consortium from submission preparations to the closing of the project

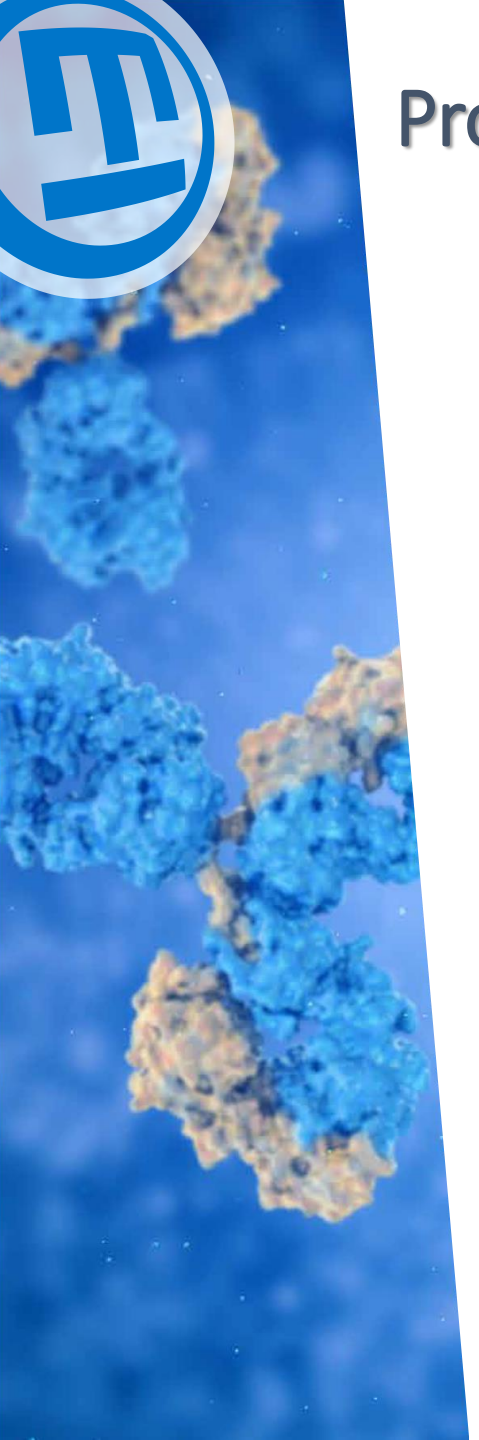


The Aim of the Project

- To develop a cross-cutting system based on smart electronics to apply to biotechnological downstream processes
- to improve the accuracy of wide-range of biotechnological processes by advancing their performance and in-process control
- With the robotic system, to develop a higher speed pipetting mechanism compared to the existing ones
- To integrate a system with a higher output compared to its competitors with sensors
- Thus, to provide a great innovation in this field.
- to reduce time in biopharmaceutical development process.

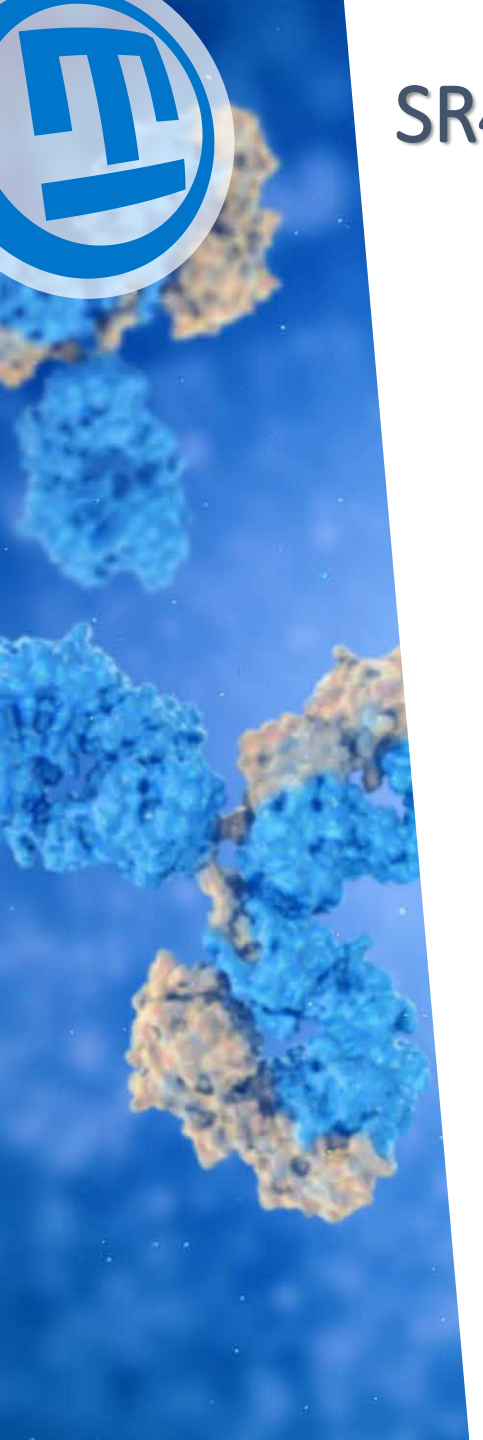
Partners and Task Distribution

- Euripides accepted the project in June 2017, and TÜBİTAK through the end of 2017.
- The project started in January 2018.
- To create high-quality biosimilar development and production technologies and platforms
- Development of a high-performance robotic platform for biotechnology
- Development of sensor technologies for use in biotechnology



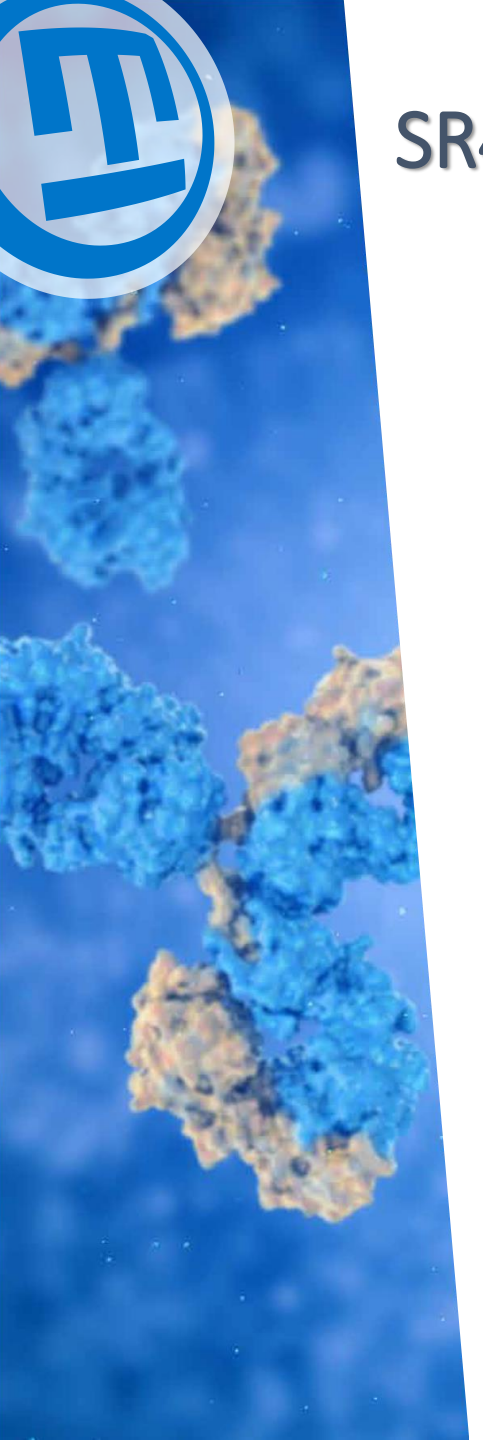
Project Process

- The consortium consisted of four companies from Turkey and Portugal.
- We organized and made two kick-off meetings to be able to make a throught study design and planning, one meeting in Iastanbul and one in Lizbon
- The communication and know-how transfer between partners were great
- TÜBİTAK has assigned two proffessors from Konya and Ankara as referees to the project
- We have preapred and presented 6-months period reports to TÜBİTAK until the end of the project and it went very well
- The proffessors were very well chosen and made detailed reviews



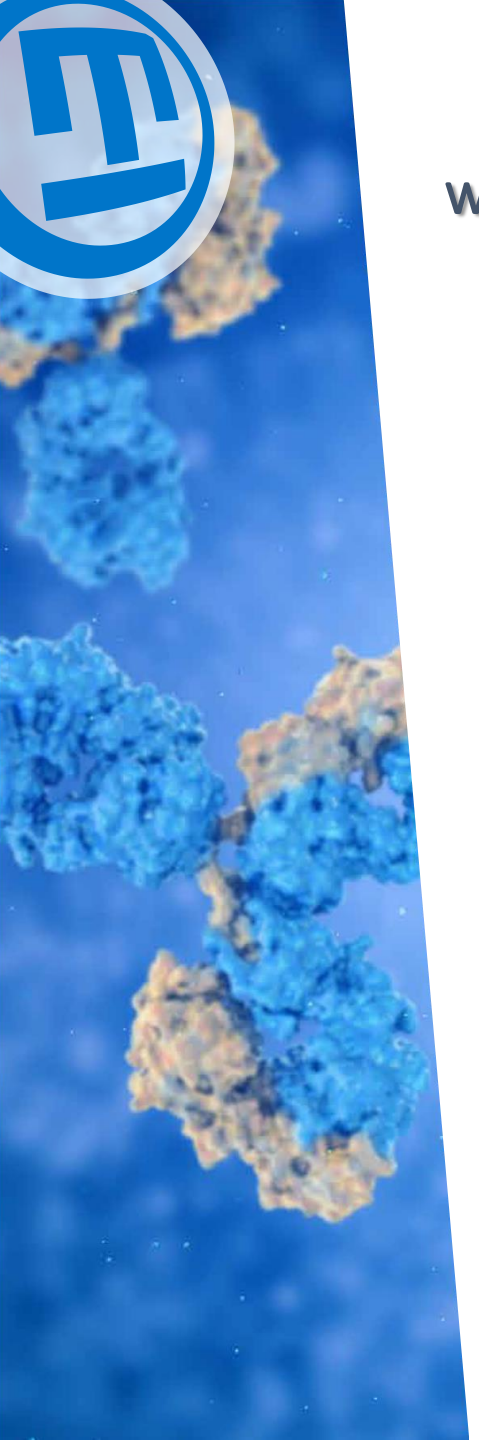
SR4SB Project Outcomes

- The SR4SB partners developed a multi-functional robotic device equipped with sensors to actuate a wide range of biotechnological processes for more accurate performance, observation, and control of the biotechnological process.
- The sensing technology is based on a set of 96-well plates (which contain the material for processing) for the downstream development of antibodies.
- Processing is monitored using various printed sensors directly integrated into the well plates or multi-channel reservoirs for different purposes (conductivity, pH, height)
- The information is then sent to the robotic device.
- This is designed to make the purification process ‘technologically holistic’ via in-process controls, chromatography techniques, and high-throughput downstream [purification] processes using smart electronics.



SR4SB Project Outcomes

- Initially developed for the processing of monoclonal antibodies, the SR4SB technology has the potential to be extended to wider groups of cell lines and proteins.
- It could bring major benefits for smarter biotechnology worldwide.
- The developed mutli-functional robotic system will be used first in Turgut’s downstream process of its biotechnological products



Project SR4SB wins 2022 EURIPIDES^2 Innovation Award

with its multi-functional robotic device for smarter biotechnological processing

- SR4SB project was chosen for its innovative work on smart electronics that can be applied to biotechnological processes.
- Initially developed for the processing of monoclonal antibodies, the SR4SB technology has the potential to be extended to wider groups of cell lines and proteins.
- As such, it could bring major benefits for smarter biotechnology worldwide.
- The two other main fields of other Euripides projects, healthcare and medical devices, has intertwined for some time now. Our project has succeded in adding engineering and integrating these three fields.

Recommendations for Euripides Project Applications

- There should be an innovation in the form of a new component, new technology, or new application
- The targeted project outcome should be sufficiently close to the market
- The partnership model should be well-balanced and bring added value through cooperation
- The partners should have clear roles that correspond to their competences and background and assure efficient realization of of the project's objectives.
- The project should demonstrate a clear sharing of risks, costs and knows how.
- Project design should include analysis of technical and market risks and a comprehensive risk management plan
- Innovation Degree is important; it should create new industries or have the potential to advance the current biotechnological industries.
- The project should be multidisciplinary

Development and production technologies and platforms

TURGUT®

Micropipette

Microcolumns

Microscale Robocolumns

Manufacturing Scale Columns

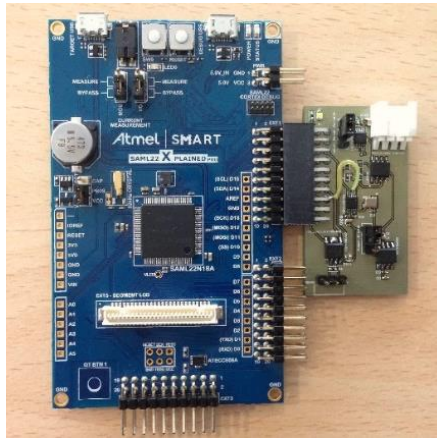
High-performance robotic platform

Pipette System

Liquid and Solid Handling System

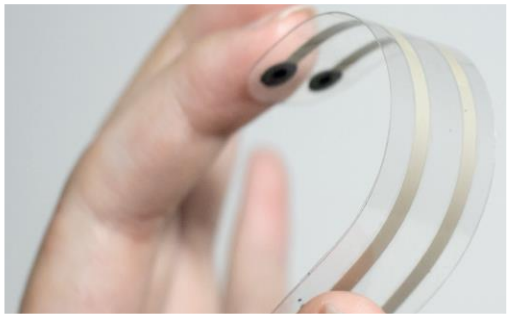
Development of sensor technologies

Data acquisition board

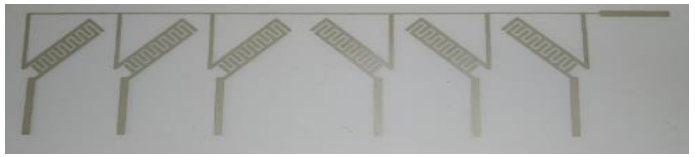


pH Sensors

Conductivity Sensors



Volume Sensors



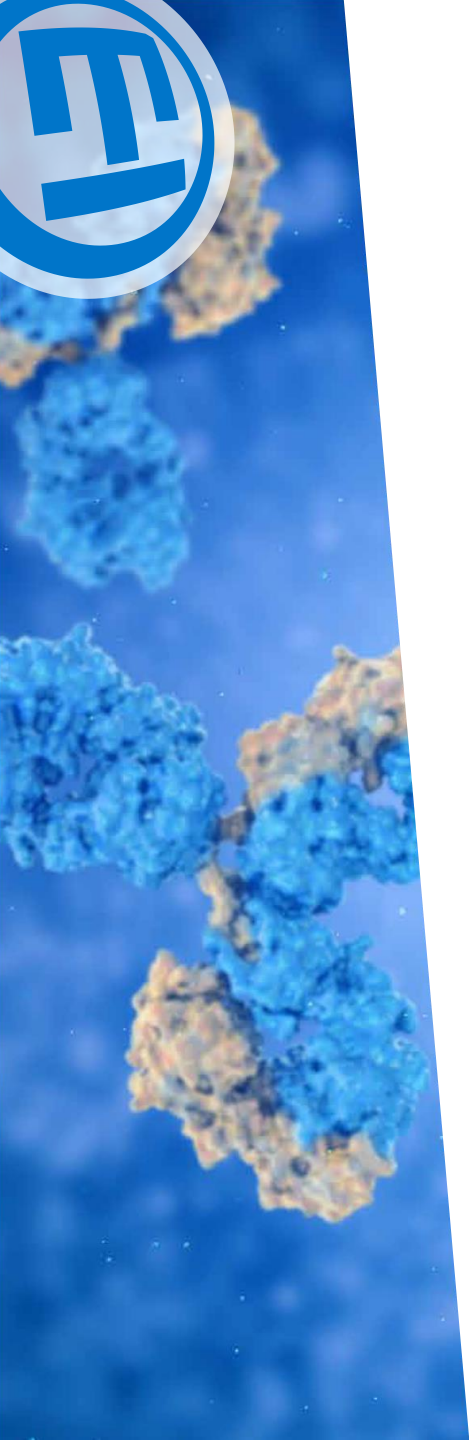
Outcome of the Project

Currently manual:

6 hours / 1 column study

Now robotic system:

6 hour / 48 column study



We hope that the innovative robotic system will gain worldwide use in biotechnological development process and its use will be extended to other industries.

Thank You!