

Plastik Atıklar ve Çevre Farkındalığı



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30 Mart 2022

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100 yılı aşkın bir inovasyon hikayesidir plastik..

- **Basit tanım, doğal materyallerde bulunmayan faydalar sunan malzemeler geliştirme ihtirasıdır plastik...**
- Yunanca'da "döküme uygun" (plastikos) ve "dökme" anlamında "plastos"...
- Ticari olarak ilk plastik 1868 yılında üretildi...
- Önceleri masumdu plastik..."gomalak" ve "sakız" gibi doğal plastik malzemelerdi...
- Sonraki plastikler "kauçuk, nitroselüloz, kolajen ve galalit" gibi doğal malzemelerin kimyasal modifikasyonu oldu...
- Modern plastikler "tamamen sentetik" malzemeler...
- "Parkesin"..Een eski örneklerden biri, 1855'te Alexander Parkes tarafından icat edildi....Bugün onu "selüloit" olarak biliyoruz.
- Polivinil klorür (PVC) ilk olarak 1838-1872 yılları arasında polimerize edildi.
- 1907'de Belçikalı-Amerikalı kimyager Leo Baekeland, ilk gerçek sentetik, seri üretilen plastik olan Bakalit'i yarattığında önemli bir atılım geldi.

100 yılı aşkın bir inovasyon hikayesidir plastik..

BRITISH PLASTICS FEDERATION BPF

Pre-1900

1284 First recorded mention of The Horners Company of London, with horn and tortoiseshell as the predominant early natural plastics.

1823 Macintosh uses rubber gum to waterproof cotton and the 'mac' is born.

1845 Besley designs extruder for gutta percha.

1850 First submarine telegraph cable in gutta percha laid between Dover and Calais.

1872 Hyatt brothers patented first plastics injection moulding machine.

1885 George Eastman Kodak patents machine for producing continuous photographic film based on cellulose nitrate.

1862 Display of Parkesine, predecessor of celluloid (cellulose nitrate), at the 1862 Great International Exhibition in London.

1880 Fashion for long hair leads to cellulose nitrate replacing horns as the preferred material for combs.

1890 Thermosetting introduced and used to make babies rattles from cellulose nitrate.

1892 Viscose silk (rayon) developed by Creso and Bevan (Chardonnet Silk).

1898 Beginning of mass production of gramophone records from shellac.

1899 Kricheldorf and Spittler in Germany awarded patent for Caside plastic from milk. Artifacts introduced at the Plastics Universal Exhibition in 1900.

1899 The Wonderful Company of Horners

1899 The P-lymer Society

1899 ColorMatrix

1899 BPF

Erken dönem

(boynuz, kaplumbağa kabuğu, kauçuk sakız, süttten kazein plastik...ilk ve doğal plastikler)

BRITISH PLASTICS FEDERATION BPF

1900-1929

1909 Casein plastics, derived from milk, developed by Erlenmeyer.

1910 Stockings made of viscose (CA) begin to be manufactured in Germany.

1915 Queen Mary sees casein products at the British Industries Fair and orders several pieces of jewellery made from it.

1919 Eichenbaum patents first cellulose acetate moulding powder.

1921 Beginning of rapid growth of plastic mouldings, especially for electrical insulators, with addition of phenolic laminates in 1930.

1922 Staudinger published his work recognising that plastics are composed of long chain molecules leading to a Nobel prize in 1935.

1924 Rohm and Haas at British Cyanide develops para-formaldehyde resin, subsequently commercialised as the first water white transparent thermosetting moulding powder.

1926 Eckert and Ziegler patent first commercial modern plastics injection moulding machine.

1926 Harrods first display of coloured thermosetting plastics tableware produced by Beslist and Adams, The Specialty Manufacturing Company and Thomas De La Rue and Co.

1929 Bakelite Ltd receives its largest ever order for phenolic moulding powder for the casing of the Siemens telephone.

1926 The P-lymer Society

1926 ColorMatrix

1926 BPF

Erken Sentetikler, Kazein, Bakalit, Üreler (ilk ticari modern plastik enjeksiyon... Siemens telefonunun kasası için fenolik kalıplama...)

BRITISH PLASTICS FEDERATION BPF

1930s

1930 'Scotch' tape, the first transparent sticky tape invented in US by 3M Company.

1932 Screw pre-plasticisation in injection moulding patented.

1933 BPF founded on the 21st December 1933. First Chairman, Charles Washburne of Insulators Limited.

1933 Faucett and Gilson at ICI discover polyethylene.

1933 Crawford at ICI develops first commercial synthesis of poly(methyl methacrylate).

1935 Troester in Germany produces first extruder designed for thermoplastics.

1937 First commercial production of polystyrene by IG Farben, Germany.

1935 Carothers and DuPont patent nylon.

1936 First production of aircraft canopies made from 'Perspex'.

1937 Colombo and Peracetti in Italy produce first twin-screw extruder machine.

1938 First toothbrush with nylon tufts manufactured.

1938 Full scale production of nylon 6 fibre begins in United States.

1938 Plunkett (DuPont) discovers PTFE.

1939 First commercial production of polyethylene in UK by ICI.

1939 outbreak of war - strategic stockpiles of materials.

1930 The P-lymer Society

1930 ColorMatrix

1930 BPF

Bir Endüstri Olarak Plastik (ilk şeffaf yapışkan bant..., nylon diş fırçası..., ticari polietilen...ve BUUM!! savaş çıktı...)

100 yılı aşkın bir inovasyon hikayesidir plastik

BRITISH PLASTICS FEDERATION BPF

1940s

1940 First production of PVC in UK

1940s Polyethylene used as radior cable insulation

1940 DuPont introduces polyacrylonitrile (PAN), an early engineering product

1941 Wainfield and Dickson, of the Calico Printers' Association of Manchester, patent polyethylene terephthalate (PET), followed by the creation of the first polyester fiber called 'Terylene'

1942 'Super Glass' (methyl cyanoacrylate) first discovered by Dr. Henry Coover, Eastman Kodak

1943 First pilot plant for polytetrafluoroethylene (PTFE) to be marketed under trade mark 'Teflon'

1944 Bakelite Handgrenade widely used by British Troops in Normandy

1945 The production of the LDPE Squezy bottle by Monsanto caused a rapid expansion of the industry with containers produced to replace glass bottles for shampoos and liquid soaps.

1947 Formica melamine faced decorative laminates introduced into the UK

1948 Introduction of 12" long playing records made from PolyVinyl Chloride (PVC)

1948 George de Mestral invents Velcro, patented in 1955

1948 Acrylonitrile-butadiene-styrene (ABS) produced

1949 High impact polystyrene introduced as a commercial plastic

1949 First Aerix self-assembly model produced (Ferguson tractor) initially made of cellulose acetate and later polystyrene

1949 Lenses in US of Tupperware made from low density polyethylene

1949 'Lora' based on polyurethane, invented by DuPont

SPONSORED BY ColorMatrix, The P-lymer Society, BPF

Savaşta plastikler (radarda polietilen..., ilk PVC... süper yapıştırıcı metil siyanoakrilat... Politetrafloroetilen-PTFE... poliüretan bazlı 'Likra')

BRITISH PLASTICS FEDERATION BPF

1950s

1950 ICI opens new factory at Risley to produce Terylene

1950s Introduction of acrylonitrile-butadiene-styrene (ABS) copolymers

1951 Festival of Britain

1953 Commercialisation of polyester fibres introduces the concept of 'rip dry' and 'iron-free'

1954 Polystyrene foam introduced by Dow Chemical Co.

1955 First production of high density polyethylene in UK

1956 DuPont files patents for first acetals (POM)

1956 Eero Saarinen's 'Tulip Chair' launched, consisting of a seat made of glass-fibre-reinforced plastic

1957 The hoop is reinvented as the 'Hula Hoop' by Knerr & Medlin, Wham-O Toy Company

1957 First production of polystyrene by Montecatini using Ziegler-Natta catalyst

1957 Lego patents its stud and block coupling system and produces toys of cellulose acetate, later Acrylonitrile-butadiene-styrene polymer

1958 First production of polyurethanes (Bayer and General Electric)

1959 Barbie Doll unveiled by Mattel at American International Toy Fair

SPONSORED BY ColorMatrix, The P-lymer Society, BPF

Tekstil, Moda, Oyuncaklar, Evsel kullanımlar (ilk polietilen torba... Polistiren köpük...,LEGO!! Saplama-blok birleştirme sisteminin patentini aldı...BARBIE DOLL doğdu..

BRITISH PLASTICS FEDERATION BPF

1960s-70s

Early 1960s introduction of water-based acrylic paints

1960 Ethylene-vinyl acetate co-polymers launched by DuPont

1962 Silicone gel breast implants pioneered successfully

1962 'Kevlar' is first developed by DuPont and used in tyres

1966 Blow moulded fuel tanks introduced

1970 First Yellow HDPE propane pipes for gas introduced into UK by Waverley/British Gas

1967 Polyvinyl Chloride (PVC) 'Blow' chair designed by Scolari, De Pas and Lomazzi, manufactured by Zanotta

1969 Neil Armstrong plants a nylon flag on the moon

1973 Martin Cooper, a Motorola researcher and executive, designs the first ever mobile phone

1973 Polyethylene terephthalate beverage bottles introduced

1976 Plastics in its great variety of forms becomes the most used type of material in the world

1977 Polyaryletheretherketone (PEEK) was first prepared by ICI

1979 First PVC-U double glazed windows installed in the UK

SPONSORED BY ColorMatrix, The P-lymer Society, BPF

Renk ve Tasarım (su bazlı akrilik boyalar... Silikon jel meme implantları,..PVC sandalye...aya naylon bayrak dikildi...mobil telefon...PVC-U çift camlı pencereler...)

100 yılı aşkın bir inovasyon hikayesidir plastik...

BRITISH PLASTICS FEDERATION BPF

1980s-90s

1980
First production of linear low density polyethylene

1980
First Blue HDPE pressure pipes for potable water introduced into UK

1983
ICI and Bayer launch PEEK, PPS (polyphenylene sulfide), and PES (polyether sulfone)

1989
First light-emitting polymers (poly-ethylene) discovered in Cambridge

1983
The slim plastics Swatch watch made of 51 components, mainly plastics

1988
Introduction of triangular recycling symbols relating to plastics

1982
First artificial heart made mainly of polyurethane, implanted in a human

1987
BASF in Germany produces a polycarbonate that has twice the electrical conductivity of copper

1989
The Graevetric Blotch Blender is invented by Steve Madigan, revolutionising the industry and bringing affordable graevetric blending to processors.

1990
ICI launches 'Eloper', the first completely sustainable biodegradable plastic

1991
Dyson's vacuum cleaner launched in Japan

1994
'Smart car' with lightweight flexible integrally coloured polycarbonate panels introduced

1998
First standing Zimex 'Or' fridge, with insulation and outer skins made in one process from polyurethane foam, introduced

SPONSORED BY
ColorMatrix, BPF, The P-lymer Society, BPF

Yüksek Performanslı Plastikler (Düşük yoğunluklu PE...içme suyu taşıyan HDPE basınçlı borular...ilk yapay plastik kalp.. 51 plastik bileşenli Swatch saat...

BRITISH PLASTICS FEDERATION BPF

2000-10

2000s
Nano-Technology applied to polymer and composite applications

2001
iPod dreamed up by Tony Fadell, an independent inventor, developed by Apple

2000
First commercial metal-alkoxide catalysed polyolefins introduced

2005
Polycard project established to look at the potential of conductive polymers

2005
NASA explores the advantages of a polyethylene based material RFX1, as the material, for the spaceship that will send man to Mars

2008
Airbus 380, comprising 22% carbon-fibre reinforced plastics, flies into Heathrow

2009
Boeing 787 (nicknamed 'Boeing's Plastic Dream') comes into service, its skin is made up of 100% Plastic composites, with plastic making up 50% of all materials in the plane

2010
The Amazon Kindle is an e-reader made with a resilient plastic outer body case. Kindle is used to read e-books, newspapers, magazines, blogs and other digital media

SPONSORED BY
ColorMatrix, BPF, The P-lymer Society, BPF

Nano Teknoloji, Airbus A380, iPod (Nanoteknolojik polimer ve kompozit uygulamaları...Mars'a gidecek uzay gemisinin PE bazlı malzemesi RFX1...%22 karbon fiber takviyeli "plastik Airbus 380" Heathrow'a uçtu...Boeing 787 (%50'si plastik) hizmete girdi.

THE STORY OF POLYVINYL CHLORIDE (PVC)

Origin of PVC 1913 German inventor Friedrich Klatte patented a polymerisation process to manufacture PVC

1920s-1950s 1926 Waldo Semon, working for BF Goodrich in the US, invented plasticised PVC providing a synthetic replacement for increasingly costly natural rubber

1930 RCA Victor launched first commercially available Vinyl long-playing record

1947 The first vinyl floor covering was manufactured by the Swedish company Limbans

1950 PVC blood bags replace glass bottles enabling blood to be safely transported

1960s-1990s 1966 Development of vinyl wall coverings for better interior hygiene

1979 First PVC-U double glazed windows installed in the UK

1995 The UK's first solar-powered office block - sponsored by the EU, DTI and Greenpeace at Northumbria University, Newcastle on Tyne features 21,000 solar cells and 646 PVC-U windows to assist thermal efficiency throughout the building

2000s 2000 European PVC industry establishes Vinyl 2010, a ten year voluntary commitment to improve the environmental performance of PVC

2003 A sustainable European PVC recycling system, Recovynl, was established

2004 First window manufactured from 100% post-consumer recycled PVC

2010s 2011 VinylPlus, a new European industry sustainability programme, established

2013 Recovynl recycles more than one million PVC-U window frames per year in the UK

2012 Over 142,000m² of PVC fabric used in the construction of London 2012 Olympic venues

The future 2020 Over 800,000 tonnes of PVC products will be recycled per year across Europe by 2020

2022 The 2022 FIFA World Cup Qatar Showcase Stadium has been designed to use super-reflective transparent PVC fabric to create a zero carbon, sustainable stadium providing comfortable playing conditions

vinyls group **BPF** **vinyl plus**

Geleceğin plastikleri (kurşun geçirmez polimer... Plastik kan...plastik güneş pilleri...hafif karbon kompozit malzemeler...3D baskı-plastik organ...esnek plastik organ...sürücüsüz plastik arabalar...ve daha neler neler)

Plastikler

- petrol ve gazdan çıkarılan monomerlerin polimerizasyonundan elde edilen sentetik organik polimerler...
- ömür ve dayanıklılığı binlerce yıl sürer...
- Plastik kullanılmayan bir sektör biliyor musunuz?
- Hafif, esnek, estetik, renkli, kolay işlenebilen, ucuz, fonksiyonel..
- **Ama.....**



2000'ler....ve plastik her yerde

Doğada plastik birikimi

- 1950'den bu yana, toplam kümülatif küresel plastik üretimi yaklaşık 10 milyar ton ve bunun sadece %55'i geri dönüşümde...
- Karalar ve okyanuslara doğru plastik kaçıışı (Geyer vd., 2017)
- Küresel düzeyde, okyanuslarda biriken plastiklerinin neredeyse %80'i karasal kaynaklı (Li ve diğerleri, 2016a)
- Polietilen (PE), Polistren (PS), Polipropilen (PP), Polivinil klorür (PVC), Poliüretan (PUR), Polietilen tereftalat (PET) yaygın olarak bulunan plastik türleridir
- Türkiye, plastik üretiminde % 2.6'lık dünya payı ile Avrupa ve Avrasya'nın önde gelen (üçüncü) ülkelerinden biri (www.pagev.org).



Doğada plastik birikimi

- Doğaya karışan plastiklerin çoğu büyük boyutlarda (**makroplastikler**) olsa da gözle görülmeyen plastiklerin (**mikro ve nanoplastikler**) oluşturduğu tehdit daha büyüktür.
- Plastik birikiminin etkilerini Su-Toprak-Hava olarak ayrı ayrı ireleyebiliriz

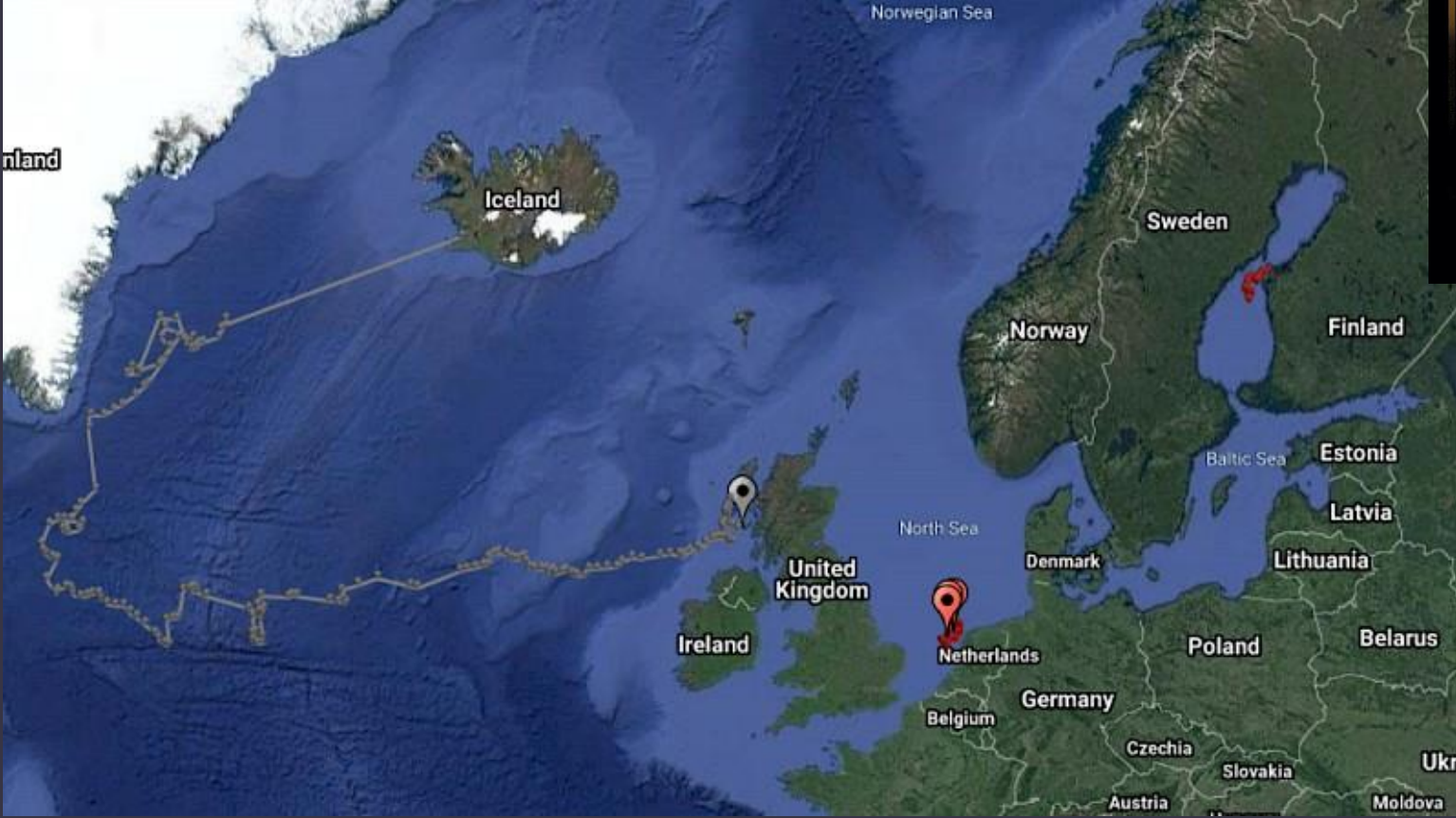


Su da plastik...

- 1970'lerin başında...okyanuslardaki planktonları çalışan bilim insanları tarafından farkediliyor...
- Dünya okyanuslarındaki yüzeye yakın plastik atık kirliliği miktarını inceleyen ilk okyanus bilimi çalışması ise 2014 yılında yayınlanmıştır.



Suda plastik...



PLASTIC IN A BOTTLE projesi...Eylül 2019...Arktik Konseyi Arktik Deniz Çevresini Koruma (PAME) Çalışma Grubu, plastiklerin okyanustaki yörüngesini takip eden bir GPS vericisi olan bir şişeyi denize bıraktı bir kapsül olan ilk “Şişedeki Plastik”i piyasaya sürdü.

Plastik Kaynakları

- ▶ **Tekstil Ürünleri: Kıyafetlerde vb. kullanılan;**
 - ▶ Polyester
 - ▶ polyamid (naylon)
 - ▶ Polar
- ▶ **Endüstriyel hammaddeler, artıkları ve döküntüleri:**
 - ▶ Paletler
 - ▶ plastik filmler
 - ▶ straforlar
 - ▶ iplik-lifler
 - ▶ köpüklü plastikler vb.
- ▶ **Ulaşımdan kaynaklananlar: Araç lastiği döküntüleri**



Peki ya çok küçük plastikler..?

Mikroplastikler (MP) = Çapı 5mm'den küçük her türden plastik parçacıklar

Birincil MP

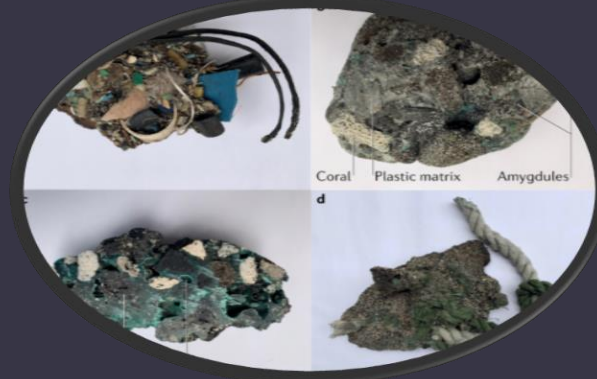
- ▶ Tüketici ürünlerinden kaynaklananlar (Kozmetiklerdeki mikroboncuklar):
 - ▶ yüz temizleme ve peeling jelleri
 - ▶ şampuan ve sabunlar
 - ▶ diş macunu
 - ▶ eyeliner, maskara, dudak parlaticısı,
 - ▶ deodorant
 - ▶ güneş kremleri



Peki ya çok küçük plastikler..?

İkincil MP (birincil MP'lerden oluşan..)

- UV-B ışınların tetiklediği dalga hareketi
- mekanik aşınma /parçalanma
- biyokimyasal bozulma



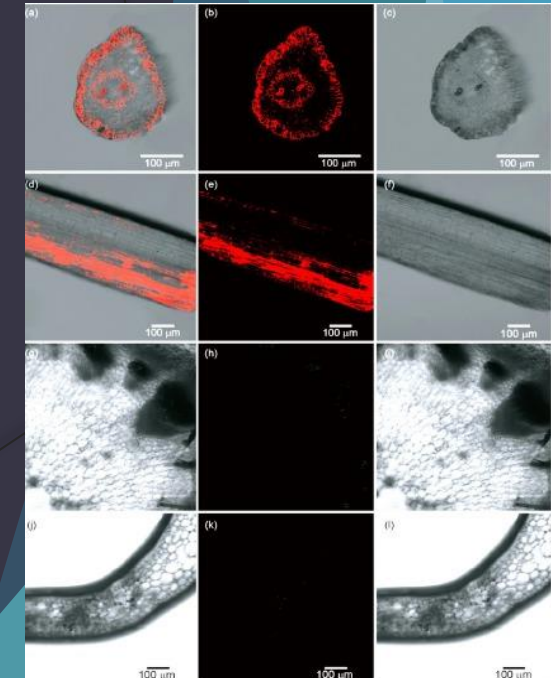
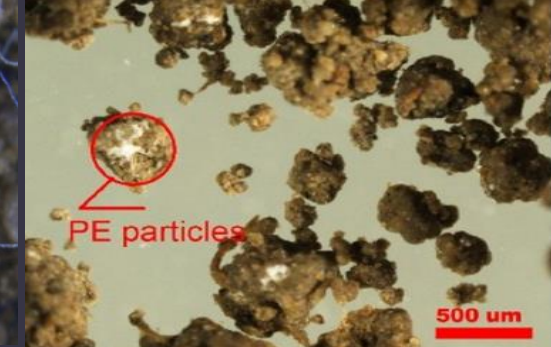
Toprakta MP birikimi

- Çapı 5 mm ve daha küçük olan plastik polimerler = Mikroplastik (MP) (1)
- Kaynakları atık su ve arıtma çamuru kullanımı / sera naylonları, plastik malçlama materyalleri / organik gübre ve kompost/ damla sulama boruları / gübre kapsülleri (2-6)
- Çin'de tarımsal film (malçlama + sera) 2,6 milyon ton / bunun 1,5 milyon ton ve toplam 18.4 milyon hektarlık bir alanı kaplıyor
- Türkiye tarımında yoğun plastik tüketimi (malçlama ve seracılık)



Toprakta MP birikimi

- MP'ler küçük partikül boyutları ve çok yavaş biyolojik bozunma hızları nedeniyle organizmalar tarafından kolayca emilebilirler
- Daha sonra gıda ağları yoluyla taşınabilirler (Horton ve diğerleri, 2017).
- Ayrıca, diğer kirleticiler (insan patojenleri, organik kirleticiler, ağır metaller) için bir taşıyıcı görevi görebilirler.
- MP Birleşmiş Milletler Çevre Programı tarafından en büyük 10 çevre probleminden biri olarak listelenmiştir (UNEP, 2014).



MethodsX 7 (2020) 100750

Contents lists available at ScienceDirect

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Method Article

Confocal measurement of microplastics uptake by plants

Lianzhen Li^a, Yongming Luo^{a,b,*}, Willie J.G.M. Peijnenburg^{c,d}, Ruijie Li^a, Jie Yang^b, Qian Zhou^a

^a Key Laboratory of Coastal Zone Environmental Processes and Ecological Remediation, Yantai Institute of Coastal Zone Research (YIC), Chinese Academy of Sciences (CAS), China

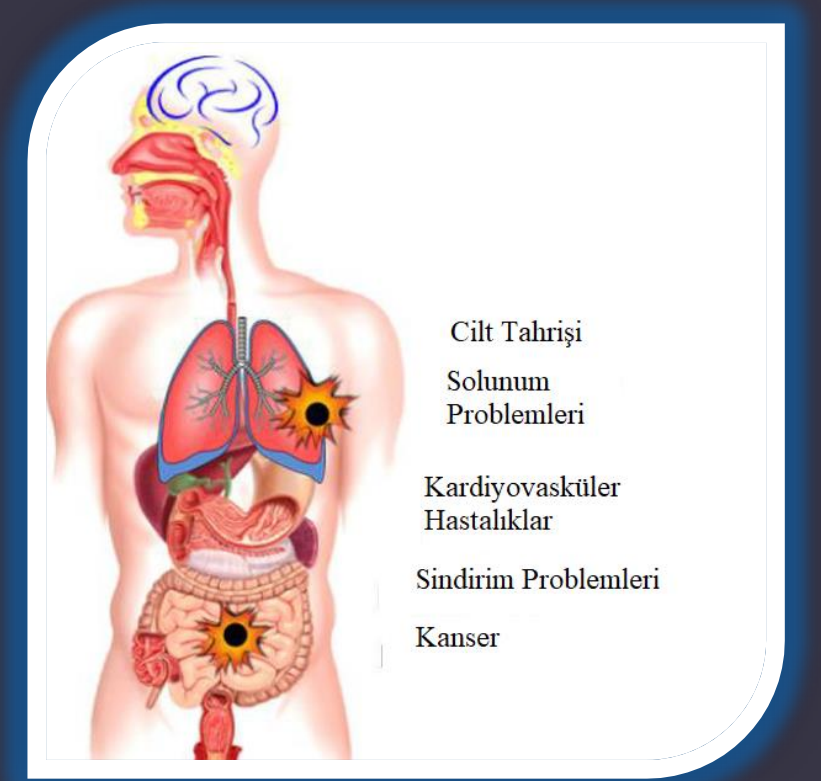
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Plastiğin İnsan Būnyesindeki Zararları

- Kanser,
- Hūcrelerin ōlümü,
- Alerjik reaksiyonlar,
- Doęumda kusurlar,
- Baęıřık bozukluęu,
- Hormonel bozukluęu gōrūlebilir.



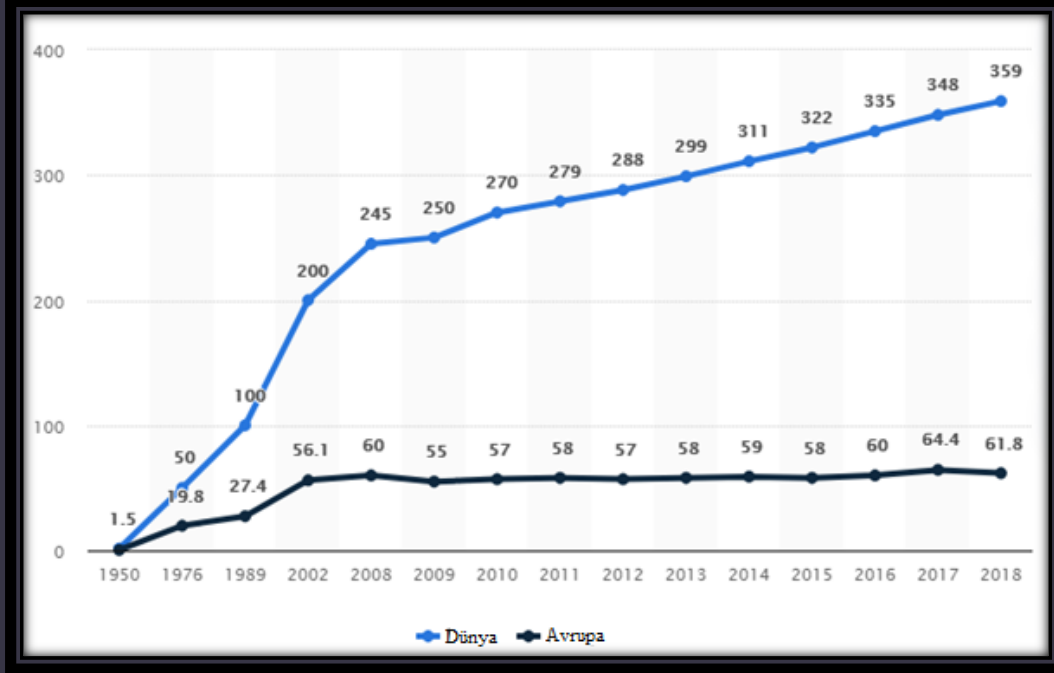
Havadaki Plastikler (mikro ve nano boyuttaki plastikler)

- Endüstriyel emisyonlar
- Petrol yan ürünlerinin yakılması
- Atık biriktirme alanlarından kaçış



★ Vücudumuzdaki mikroplastiklerin çoğu soluduğumuz havadan kaynaklıdır.

Türkiye ve Dünyadaki Plastik Üretim-Tüketimleri



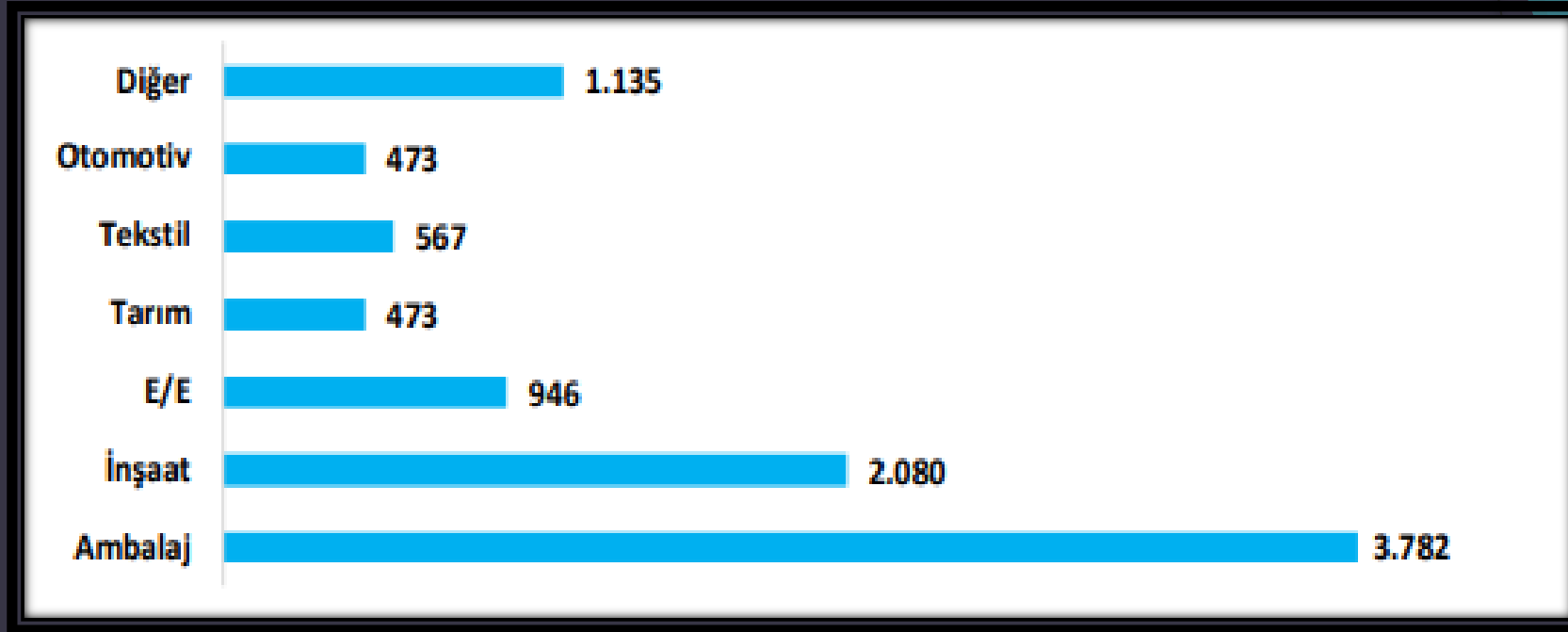
1950-2018 dönemi Dünya ve Avrupanın milyon ton cinsinden plastik üretimi (M. Garside 2019)

	2015	2016	2017	2018	2019	CAGR (%) 2018/2015	% Artış 2019/2018
Milyon Ton	8,57	8,87	9,62	9,14	9,46	2,2	3,4
Milyar \$	32,8	33,8	36,8	34,3	33,4	1,4	-2,5

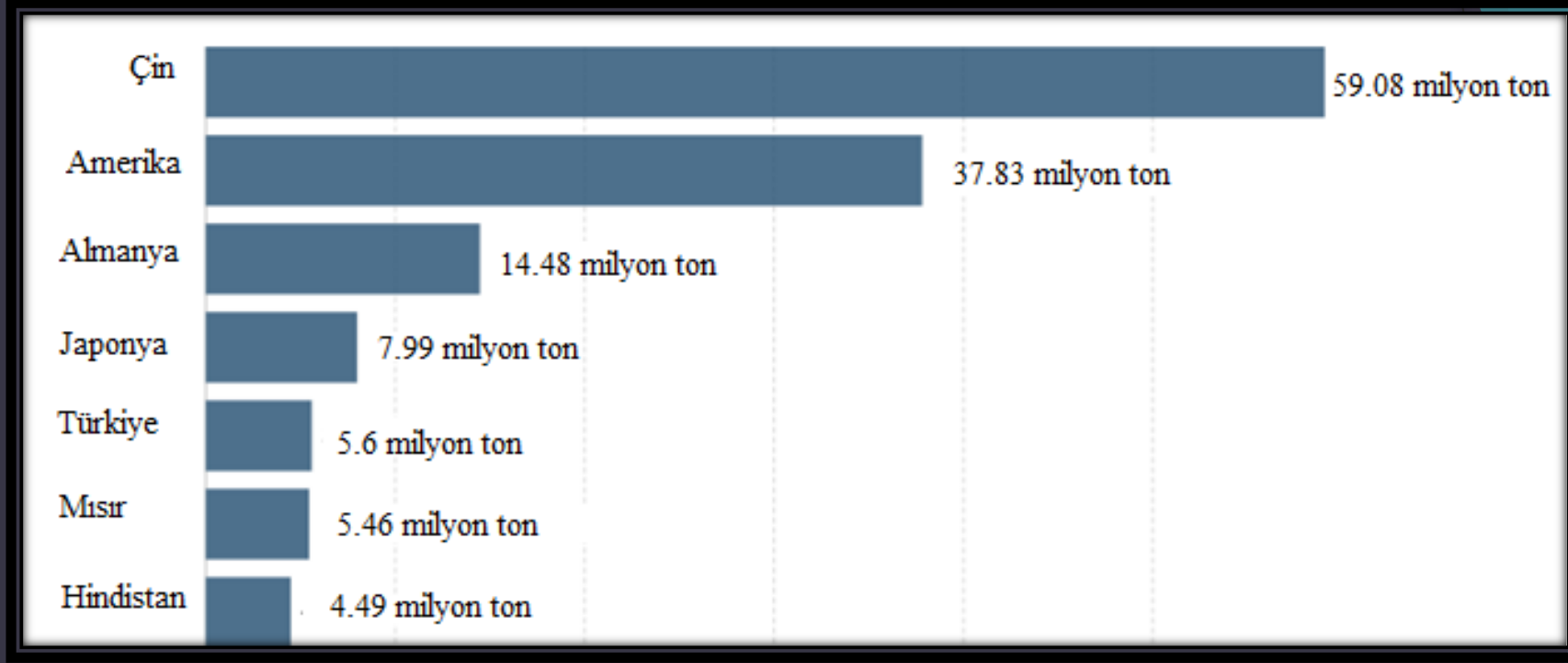
Türkiyedeki plastik mamul üretimi (Pagev 2019/3)



Dünyada plastik üretiminde açık fark ile Çin ilk sıradadır. Endüstri devi olan Çin Dünyadaki tüm plastik üretiminin yaklaşık %30unu tek başına üstlenmektedir.



Türkiyede alt sektörler bazında plastik mamul üretimi (Pagev 2019)



Bazı ülkelerde 2010 için üretilen plastik atık miktarları (Ourworldindata, plastic pollution, 2010)



The Great Wave off the Coast of Kanagawa
[Hokusai](#), 1831

TEŞEKKÜRLER...

