

# Welcome to the First International Workshop on Multi-functional Nanocarbon Fibres (MNF 2018), Madrid 2018!!!

June 27-29, 2018 • Madrid, Spain

## About your Registration

**Full Conference Registration and Student Registration** include coffee breaks, conference luncheons, welcome reception and access to the technical sessions, the guided visit to the Old Madrid and the conference banquet.

Guests may purchase tickets for the welcoming reception and the conference luncheons at the registration desk. Tickets are 20 € (Guided Visit to Old Madrid) and 50 € (Conference Banquet). Badges must be worn to gain access to the technical sessions and social functions.

## Note to speakers

Presentations must be loaded in the central computer room 15 minutes before the start of the corresponding session.

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## Wednesday 27 June 2018

08:30	-	09:00		Registration	SS Hall
09:00	-	09:30	Mauricio Terrones & Juan José Vilatela	Conference Opening	Auditorium
<b>Session 1</b>		<b>Theme: Synthesis and processing</b>			
09:30	-	10:00	Matteo Pasquali	Carbon Nanotube Fibers turn 18 years old: what's in their future?	Auditorium
10:00	-	10:30	Bon-Cheol Ku	Molecularly Engineered Carbon Nanotube Fibers	Auditorium
10:30	-	11:00	Hyunjung Cho	Reduction of two scales of voids in carbon nanotube fibers by wet stretching	Auditorium
11:00	-	11:30	COFFEE BREAK		
<b>Session 2</b>		<b>Theme: Synthesis and processing</b>			
11:30	-	12:00	Pulickel M. Ajayan	Nano-Engineered Multifunctional Carbon Materials	Auditorium
12:00	-	12:30	Marie Föllmer	Structuration of lignin-based carbon fibres through liquid crystalline graphene oxide	Auditorium
12:30	-	13:00	Rosa Garriga	Wet-spun graphene oxide fiber functionalization with 2D oligoglycine tectomer adhesives	Auditorium
13:00	-	13:30	Hyeon Su Jeong	All carbon fiber-based wearable NO2 sensors	Auditorium
13:30	-	14:30	LUNCH (SS HALL)		
<b>Session 3</b>		<b>Theme: Synthesis and processing</b>			
14:30	-	15:00	Alan Windle	Fifteen years of direct spinning of carbon nanotube fibres	Auditorium
15:00	-	15:30	Julien Roman	Lignin-based carbon nanofibers made by electrospinning	Auditorium
15:30	-	16:00	Martine Mayne-L'Hermitte	Preparation and electrical conductivity of different fibres prepared from vertically aligned carbon nanotubes	Auditorium
16:00	-	16:30	Manishkumar D. Yadav	Effect of hydrogen concentration on defect density of carbon nanotube aerogel synthesized by floating catalyst chemical vapour deposition	Auditorium
16:30	-	17:00	Rodolfo Cruz-Silva	Graphene oxide fibers by scrolling: preparation, properties and potential applications	Auditorium
17:15	DEPARTURE				
18:15	-	20:00	<b>VISIT MADRID</b>	MADRID	

# Thursday 28 June 2018

## Session 4 Theme: Multifunctionality: Energy storage and smart systems

09:00 - 09:30	Qingwen Li	Carbon-Nanotube Fibers for Wearable Devices and Smart Textiles	Auditorium
09:30 - 10:00	Rubén Costa	CNT fibres for solar energy conversion	Auditorium
10:00 - 10:30	Milo Shaffer	Incorporating nanostructures into next generation fibre reinforcements	Auditorium
10:30 - 11:00	Edgar Muñoz	Electron Transport and Electrochemical Properties of Wet-spun Carbon Nanotube- and Graphene Oxide Fibers	Auditorium

11:00 - 11:30 COFFEE BREAK

## Session 5 Theme: Multifunctionality and energy storage

11:30 - 12:00	Philipp Schlee	Free-standing supercapacitors based on porous carbon nanofibers from Kraft lignin	Auditorium
12:00 - 12:30	Lauren Taylor	Washable ECG Electrodes from Sewn High Performance Carbon Nanotube Fibers	Auditorium
12:30 - 13:00	Evgeny Senokos	CNT fibre electrodes: structure and electrochemical properties	Auditorium
13:00 - 13:30	Philippe Poulin	Functional nanocarbon - polymer composite fibers: from torsional actuators to biofuel cell electrodes.	Auditorium

13:30 - 14:30 LUNCH (SS HALL)

## Session 6 Theme: Multifunctionality: Electrical and mechanical applications

14:30 - 15:00	Vesselin Shanov	Multifunctional Carbon Nanotube Fibers for Advanced Applications	Auditorium
15:00 - 15:30	Young-Kwan Kim	The seed-mediated growth of gold nanoparticles on carbon nanotube fibers for simultaneous enhancement of their mechanical and electrical properties	Auditorium
15:30 - 16:00	Hyeonjun Song	Improvement of electrical conductivity of carbon nanotube fibers produced via high yield synthetic route	Auditorium
16:00 - 16:30	Tamara Blanco	Multifunctional Composites for Aeronautical Structure	Auditorium

16:30 - 17:30

VISIT TO IMDEA MATERIALS

17:30 - 17:45

RECEPTION DRINK

SS Hall

18:00

DEPARTURE

20:30 - 00:00

CONFERENCE BANQUET

Madrid

# Friday 29 June 2018

## Session 7 Theme: Structure and mechanical properties

09:00 - 09:30	Benji Maruyama	Autonomous Experimentation Applied to Carbon Nanotube Synthesis	Auditorium
09:30 - 10:00	Oliver Dewey	Mechanical Characterization of High Conductivity, High Tensile Strength Neat Carbon Nanotube Fibers	Auditorium
10:00 - 10:30	Toshiya Okazaki	Nanotube-Length and Packing Density Dependences on Electrical and Mechanical Properties of Carbon Nanotube Fibres	Auditorium
10:30 - 11:00	Álvaro Ridruejo	Advanced characterization of macroscopic ensembles of CNTs	Auditorium

11:00 - 11:30 COFFEE BREAK

## Session 8 Theme: Composites and multifunctional fibres

11:30 - 12:00	Melik C. Demirel	Multifunctional Bio-Inorganic Fibers and Composites	Auditorium
12:00 - 12:30	Anastasiia Mikhailchan	From single CNT fibre to high volume fraction reinforced composites: insights into epoxy infiltration and curing via direct chemical imaging	Auditorium
12:30 - 13:00	Vladimir Z. Mordkovich	Extra-long carbon nanotubes: continuous growth and pulling into big spools	Auditorium
13:00 - 13:30	Jandro Abot	Carbon Nanotube Yarn Sensors: Unveiling Their Piezoresistivity Towards Strain Measurement and Damage Detection	Auditorium

13:30 - 14:30 LUNCH (SS HALL)

## Session 9 Theme: Scale-up and industrialization





14:30 - 15:00	Shuki Yeshurun	Non-woven CNT mats produced by Tortechnano Fibers as a platform for innovative applications	Auditorium
15:00 - 15:30	Martin Simmons	Carbon Nanomaterial: a Hexcel Perspective	Auditorium
15:30 - 16:00	Claire Longet	Mechanical, thermal and fire behavior of silicone and fluorosilicone graphene nanocomposites	Auditorium
16:00 - 16:30	Anirban Kundu	Graphene Oxide Demonstrates Experimental Confirmation of Abraham Pressure on Solid Surface	Auditorium

16:30 - 17:00	<b>ROUND TABLE AND CLOSING REMARKS</b>		
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17:15 DEPARTURE

# Basement



-  Toilets
-  Elevators
-  Stairs
-  Exit

## SPONSORS



**ELSEVIER**

**Carbon2018**

The World Conference on Carbon  
Madrid, SPAIN, July 1<sup>st</sup>-6<sup>th</sup>



**gec**  
grupo español del carbón



## About the Conference Location

### Computer/Network Facilities

IMDEA Materials Institute has guest wireless connection available in the whole building.

Wifi: IMDEA-GUEST

Password: ImdeaInternet

### How to arrive to IMDEA Materials Institute

IMDEA Materials Institute is located at the Scientific and Technological Park of the Polytechnic University of Madrid in Tecnogetafe.

Address:

Calle Eric Kandel, 2

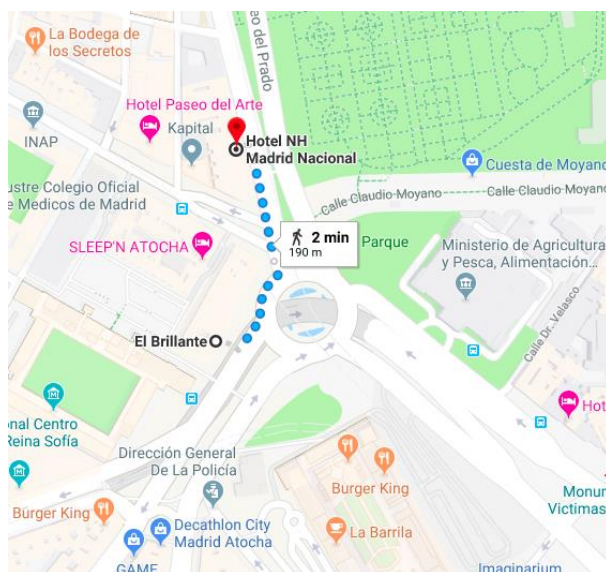
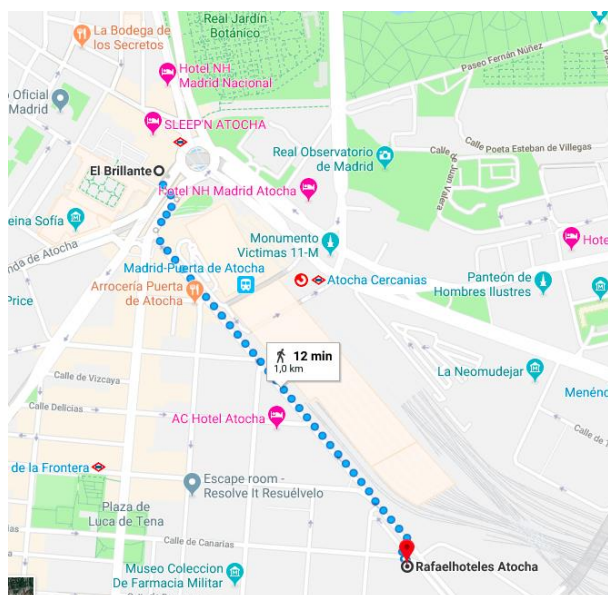
28906 Getafe

The conference provides **shuttle** services to and from the hotels to IMDEA Materials Institute. Please see below the shuttle schedule corresponding to each day of the workshop. The traveling time is approximately 30 mins. The bus stop near the hotels recommended is show in the map below.

**It is highly recommended that all participants use this shuttle service, as it is the most convenient way to get to the venue.**

Alternative ways to arrive to IMDEA Materials Institute include taxi (approximately 25-35 euro, travelling time from Atocha: 30 min, see detailed directions and map below) and public transport (traveling time from Atocha: 1:00h, see directions below).

**If you have any question about how to reach IMDEA Materials please contact Mariana Huerta at +34 915493422.**



**Map showing the location of the bus to be taken near NH Nacional and Rafael Hoteles Atocha (in front of the cafeteria “El brillante”)**

## SHUTTLE SCHEDULE FROM/TO THE HOTELS TO/FROM THE CONFERENCE VENUE

### Hotel to IMDEA Materials Institute

#### Wednesday, June 27th

8:00 am in Atocha\*

#### Thursday, June 28th

8:20 am in Atocha\*

#### Friday, June 29th

8:20 am in Atocha\*

### IMDEA Materials Institute to Hotels & Visit to the Old Madrid

#### Wednesday June 27th

5:15 pm to Atocha \*\*

#### Thursday, June 28th

6:00 pm to Atocha \*

#### Friday, June 29th

5:15 pm to Atocha \*

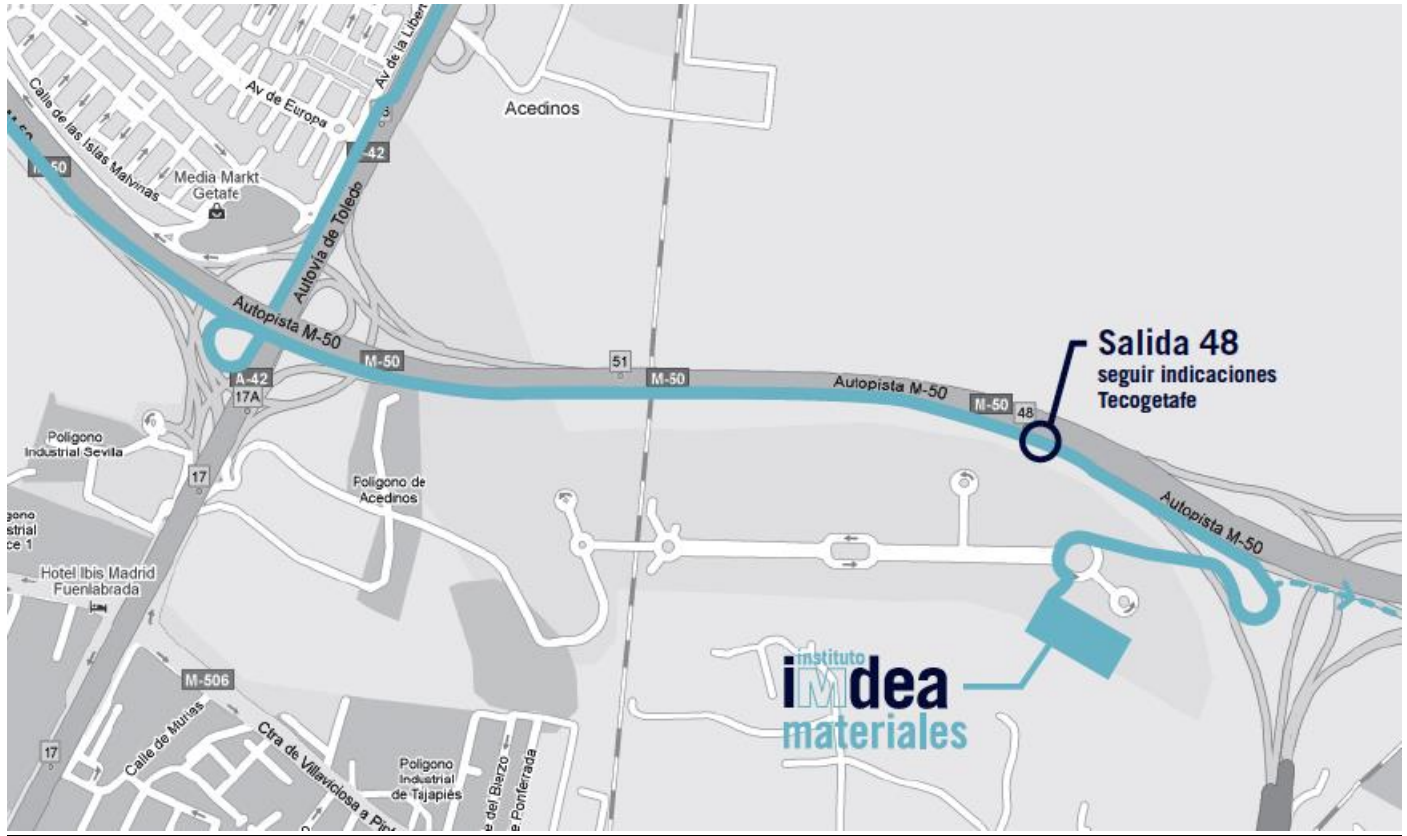
(\*) The bus stop will be in front of the cafeteria “El brillante”

(\*\*) A bus will leave near the hotel NH Nacional and Rafael Hoteles (in front of the cafeteria “El brillante”) at 6:15 pm to go to the Plaza de la Villa, where the visit to the Old Madrid will start.



**Map (to be printed and shown to the driver if taking a taxi)**

## **By taxi**



## **From Atocha Train Station (near NH Nacional and Rafael Hoteles)**

- Head southeast toward Paseo de la Infanta Isabel (130 m)
- Exit the roundabout onto Paseo de la Infanta Isabel (42 m)
- Take the ramp onto Paseo de la Infanta Isabel (260 m)
- At the roundabout, take the 3rd exit onto Plaza del Emperador Carlos V (280 m)
- Continue onto Paseo de Sta María de la Cabeza (1.9 km)
- Continue onto A-42 (signs for Toledo/R-5/Badajoz/Plaza de Fernández Ladreda) (13.2 km)
- Take exit 15b toward M-50/todas direcciones (600 m)
- Continue on the right and take the second exit on the right M-50/R-4 Córdoba/A4/A3 (2.1 km)
- Continue onto M-50 and take exit 48 (300 m)
- Keep left at the fork, follow signs for Tecnogetafe (400 m)
- Follow signs for Tecnogetafe until reaching a roundabout, take the second exit (1 km)
- At the next roundabout take the first exit right onto Calle Eric Kandel, where IMDEA Materials Institute is located.

### **From Barajas Airport (Terminals T1, T2 y T3):**

- Join the M-14 via the ramp on the left towards Madrid /Av. América/A-2/M-40/A-3/A-4/A-5.
- Take the left exit towards M-40/M-40 R-3/A-3/R-4/A-4/A-42/R-5 direction until you reach Exit 25 to take the A-42 towards Toledo. Keep driving along A42 highway (13.2 Km)
- Take exit 15b toward M-50/todas direcciones (600 m)
- Continue on the right and take the second exit on the right M-50/R-4 Córdoba/A4/A3 (2.1 km)
- Continue onto M-50 and take exit 48 (300 m)
- Keep left at the fork, follow signs for Tecnogetafe (400 m)
- Follow signs for Tecnogetafe until reaching a roundabout, take the second exit (1 km)
- At the next roundabout take the first exit right onto Calle Eric Kandel, where IMDEA Materials Institute is located.

### **From Barajas Airport (Terminal T4):**

- Go straight until you reach a fork where you must keep right to follow the signs to Madrid.
- Continue straight to take at a junction Eje-Aeropuerto/M-12 left towards Madrid/M-11/M-40 (In this highway will have to pay a toll).
- Take the M-40/M-40 Highway exit, continue in this sense and get to the fork, bear right and follow signs for M-40/E-90/A-2 / and merge onto highway Zaragoza/R-3/A-3/R-4/A-4/A-42/R-5 M-40/M-40.
- Take exit 25 to merge onto A-42 toward Toledo (10.5 Km)
- Take exit 15b toward M-50/todas direcciones (600 m)
- Continue on the right and take the second exit on the right M-50/R-4 Córdoba/A4/A3 (2.1 km)
- Continue onto M-50 and take exit 48 (300 m)
- Keep left at the fork, follow signs for Tecnogetafe (400 m)
- Follow signs for Tecnogetafe until reaching a roundabout, take the second exit (1 km)
- At the next roundabout take the first exit right onto Calle Eric Kandel, where IMDEA Materials Institute is located.

## Public Transport (not recommended)

You should take “Cercanías” line C-4 (in Sol or Atocha) heading to Parla and stop at the Metro/Cercanías station of *Getafe Central* (Estimated time from Atocha Station: 25 minutes, price 1.50€) and then catch the Tecnogetafe shuttle service (Estimated time 20 minutes, price free). The first stop of the bus service is located about 50 meters on the right/down as you exit the station (The bus stop is shown in the picture below). The shuttle service is run by the bus company SAMAR (in the top front of the bus you will see a sign of *Tecnogetafe*). The last stop of this shuttle is right in front of IMDEA Materials Institute.

### Monday to Thursday

#### **Getafe Central - IMDEA**

06:45	07:00
07:30	07:50
07:50	08:10
08:10	08:30
08:30	08:50
08:55	09:15
09:40	10:00

13:50	14:10
14:30	14:50
15:10	15:30

17:35	17:55
18:25	18:45
19:05	19:25
19:45	20:00

#### **IMDEA - Getafe Central**

07:00	07:30
07:50	08:10
08:10	8:30
08:30	08:55
09:15	09:40

13:30	13:50
14:10	14:30
14:50	15:10
15:30	15:50
17:15	17:35
18:05	18:25
18:45	19:05
19:25	19:45
20:00	20:15

### Friday

#### **Getafe Central - IMDEA**

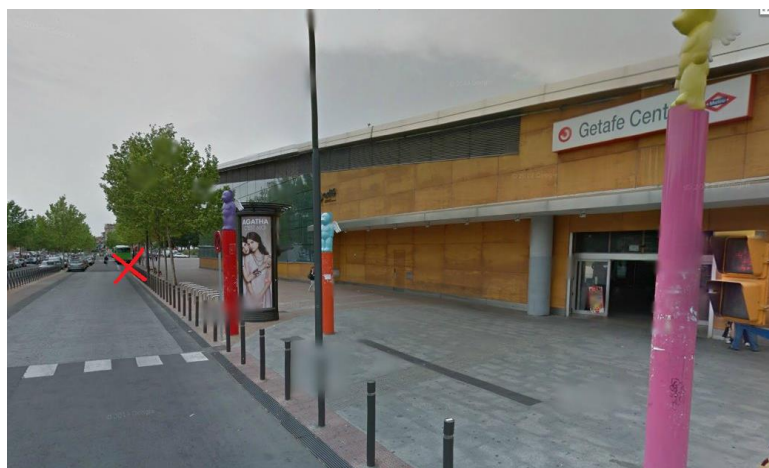
07:30	07:50
07:50	08:10
08:10	08:30
08:30	08:50
08:55	09:15
9 40	10 00

13:50	14:10
14:30	14:50
15:10	15:30

#### **IMDEA - Getafe Central**

07:50	08:10
08:10	8:30
08:30	08:55
09:15	09:40

13:30	13:50
14:10	14:30
14:50	15:10
15:10	15:30
15:30	15:50
18:05	18:25



## Program notes

### Technical Sessions

The Technical program will begin Wednesday, June 27<sup>th</sup> and conclude Friday, June 29<sup>th</sup>

The conference will be organized to include plenary sessions on the different topics of the conference. Each session will had a keynote lecture given by an internationally-recognized expert on a predetermined topic and followed by oral presentations on a similar topic. Time will be included in the program for ad hoc meetings, informal discussions, and/or outings to local cultural attractions. This format is designed to promote dialogue and enhance the exchange of ideas among the participants.

All participants are expected both to attend the entire conference and to contribute actively to the discussions. The conference will take place in an informal atmosphere.

The topics covered by the workshop include experiment and/or theory research on CNT- and/or graphene-based fibres, with a particular interest in:

- Synthesis (CVD, wet-spinning, purification)
- Mechanical properties
- Transport properties
- Energy storage and harvesting (Solar, piezoelectric)
- Composites
- Sensors and actuators
- Processes and Industrialization

## Organizing Committee

### Conference Chairs

- **Dr. Juan José Vilatela** (*IMDEA Materials Institute*)
- **Prof. Mauricio Terrones** (*IMDEA Materials Institute*)
- **Prof. Ignacio Martín Gullón** (*Universidad de Alicante*)

### Keynote Speakers

- **Pulickel Ajayan**, *Rice University*, USA
- **Melik Demirel**, *Penn State University*, USA
- **Toshiya Okazaki**, *AIST*, Japan
- **Martin Simmons**, *Hexcel*, UK
- **Tamara Blanco**, *Airbus Operations*, Spain
- **Qingwen Li**, *SINANO*, China
- **Matteo Pasquali**, *Rice University*, US
- **Milo Shaffer**, *Imperial College*, UK
- **Benji Maruyama**, *AFRL*, USA
- **Philippe Poulin**, *CNRS Bordeaux*, France
- **Vesselin Shanov**, *University of Cincinnati*, USA
- **Alan Windle**, *University of Cambridge*, UK

## GUIDED VISIT TO THE OLD MADRID Wednesday, June 27

The area known as *Austria's Madrid*, or the Madrid of the Habsburg, after the Austrian royal dynasty who reigned in Spain until 1700, is the oldest section of the city, and it is full of historical attractions. You will feel the charm of old medieval renaissance Madrid in the narrow quiet streets around Plaza de la Villa, the Convent of las Carboneras, la Basilica de San Miguel and, of course, the Plaza Mayor where you can find the Cava Baja street, which is very lively all nights of the week. Again, at the calle Mayor, there is the Mercado de San Miguel, a cute 1913 iron market. We will stop at the Cathedral of la Almudena, and will finish our journey at the Plaza de Oriente, in the vicinity of the Royal Palace.



- A bus will leave at 5:15 pm from IMDEA Materials to Atocha. So you can leave all your personal things in the hotel.
- There will be a **bus** in front of the cafeteria “El brillante” (near **the hotels** - see map in the **page VI**) at 6:15 pm to go to the **Plaza de la Villa**, where the visit to the old Madrid will start



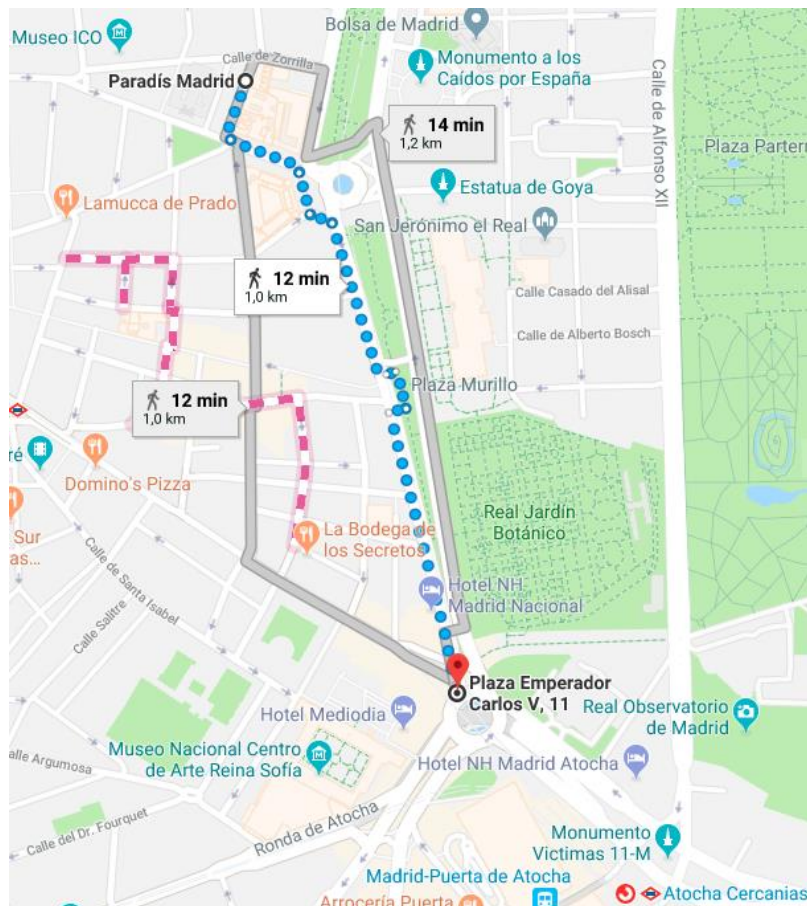
# Conference Banquet

## TIME:

- 8:30 pm – 11:30 pm, June 28th (Thursday)

## LOCATION:

- **Restaurant “Paradis Madrid”**  
Calle Marqués de Cubas, 14, 28014 Madrid



*10 minutes walk from Atocha*