

SAMPLE APPLICATION #1

Project Title: From Exception to Center: Carceral Feminisms, Immigration Enforcement, and the Figure of the Immigrant Domestic Violence Victim-Survivor

Abstract

I propose to use the Faculty Development Grant to develop my current research into an article for publication. This article will examine the implications of the criminalization of domestic violence on immigrant victim-survivors by offering an analysis of the relationship between local, state, and federal policies emerging from feminist advocacy efforts to protect survivors of domestic violence and laws that regulate immigrant communities. This research will also be included in a book-length manuscript that explores the racial politics of anti-violence advocacy work in New York City (1980-present) by focusing on discourses about the criminalization of domestic violence in minoritized communities.

Project Narrative

I am applying for a Faculty Development Grant to develop a section of my current research into an article for publication. This article will examine the implications of the criminalization of domestic violence on immigrant victim-survivors by offering an analysis of the relationship between local, state, and federal policies that emerge from feminist advocacy efforts to aim to protect survivors of domestic violence and laws that regulate immigrant communities. I will demonstrate how the gaps between these policies produce particular challenges for victim-survivors who do not have secure citizenship status. Support from this grant will allow me to conduct additional policy research and analysis to provide a socio-legal historical context for empirical research I have already conducted with community-based organizations that work on responses to gender-based violence in immigrant communities.

This article is part of a larger research project. I am currently working on a book-length manuscript project that explores the racial politics of anti-violence advocacy work in New York City (1980-present) through a focus on discourses about the criminalization of domestic violence in minoritized communities. In this project, I take South Asian communities in the U.S. (made up of people descended from Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka) as a case study through which to understand the intersectional relationships between race/ethnicity, gender/sexuality, class, religion, citizenship, and dynamics of policing and surveillance. I situate the story of South Asian community-based work within the context of New York City racial politics to look at the role that advocacy premised on culture, and the cultural-specificity of the victim-survivors' needs, plays in debates about policy solutions that respond to intimate violence. This research project utilizes ethnographic research of local anti-violence organizations; policy analysis of local, state and national legislation; archival study of local coalition work; and a close analysis of selected legal cases to offer a sociological history of how discourses of criminalization of domestic violence have produced understandings of safety and violence in minoritized communities in New York City.

This research project grows out of my dissertation, "Negotiating Violence, Navigating Neoliberalism: Domestic Violence Advocacy Efforts in South Asian Communities in Post-9/11 New York City." My dissertation research was concerned with the evolution of anti-violence work in South Asian communities, which, over the last three decades, has become one of the most institutionalized forms of activism among these groups. My dissertation examined responses to gender-based violence to understand the relationships between state

institutions, non-profit organizations, and South Asian immigrant and diasporic communities within a context of neoliberal capitalism, multicultural feminism, and post-9/11 anti-terrorism discourses. This study was based in data collected through multiple qualitative research methods such as policy and budget analysis of anti-violence legislation, in-depth interviews with leaders in South Asian community-based organizations, content analysis of informational materials about domestic relevant public events and activities.

In reading anti-domestic violence activism through the relationships between state policies and localized responses, I illuminated the complexities that community-based organizations face in their everyday advocacy practices with South Asian survivors of domestic violence. Underlying this exploration was focused attention to internal differentiations of vulnerability to institutional violence in South Asian American communities—based on religion, sexuality, immigration status, and class—and how these dynamics are addressed and/or avoided in community social change work. I was particularly interested in how post-9/11 policy initiatives affected advocacy strategies for victim-survivors of domestic violence that were at risk for detention or deportation.

These internal differentiations of vulnerability were most visible through exploration of the impacts of the criminalization of domestic violence, institutionalized through the passage of the Violence Against Women Act in 1994. For communities who are in insecure positions with the state because of their social location (e.g. racial identity, class position, citizenship status), the criminalization of domestic violence can produce variant outcomes, including additional harm. For these victim-survivors, interactions with state institutions may not be or feel safe. Thus, calling state agents, such as the police, or participating in criminal legal processes, such as the prosecution of an abusive partner, entails risk. At the same time, participation in criminal legal processes where authoritative evidence, such as police reports, legitimates the experience of victim-survivors can serve as an essential entry point to access public assistance and other social services.

Victim-survivors that are minoritized due to race/ethnicity, gender/sexuality, class, and/or citizenship status grapple with these complex risk assessments, gauging possibilities of safety and violence in their intimate relationships as well as relationships with state institutions (Bhuyan 2006). Community-based advocacy efforts are positioned to negotiate these complicated dynamics between the state and victim-survivors of intimate violence. My book project takes up concerns about the impact of criminalization of domestic violence and widens it, to locate these dynamics in South Asian communities within a larger historical context of debates about policing and surveillance in the anti-violence movement in New York City.

A critical finding in my research thus far concerns the role that culture has played in anti-domestic violence work in South Asian immigrant communities. Culture has been a terrain of struggle for Asian immigrant communities (Lowe 1996), and South Asian feminist scholars have contributed new understandings of the relationship between culture, gender, and violence (Das Gupta 2005). Engaging assumptions about culture has been a significant part of anti-violence scholarship and/or activism in South Asian communities in the U.S. from its onset. The assertion of the culturally-specific needs of the South Asian victim-survivor has worked to intervene in essentialist ideas about patriarchy in South Asian communities. It has also served to interrupt dominant constructions of a universal experience of domestic violence that is

devoid of cultural context. Anti-violence advocacy has grown steadily through a platform of cultural-specificity, in which a premise of shared culture is the mode through which South Asian women's needs, experiences, and life conditions are articulated. Scholarship and advocacy that focuses on the unique culturally-specific needs of South Asian women has helped produce a vehicle through which attention can be afforded to this population. Culture, thus, becomes the methodology for this work.

I argue that an emphasis on unique cultural factors obscures structural concerns that South Asian immigrant communities face when interacting with state institutions, particularly the criminal legal system. Cultural frameworks have become a way to manage complexities of structural inequality, racism, and conditions of insecurity. There has been a gap in attention to both the technologies of state-sponsored racism that differentially impact people *within* South Asian communities as well as *across* racialized populations.

My project, thus, links issues of intimate violence with institutional violence, such as law/policy that increase policing/surveillance of immigrant communities. These connections are already being made by academic researchers who work on the intersection of issues of mass incarceration, crime control and domestic violence law (e.g. Alexander 2006; Richie 2012), though Asian communities are generally not included in this body of research. Meanwhile, scholarship about intimate violence in South Asian immigrant communities (e.g. Dasgupta and Warriar 1996; Raj and Silverman 2002) has not addressed the role that criminalization of domestic violence plays in these experiences, and, in particular, has not examined the risks that face community members who are already at risk for institutional violence. My research expands our understanding of the implications of living in the United States as part of a minoritized population. This research contributes to academic dialogue in Sociology, Urban Studies, Ethnic Studies, and Women's and Gender Studies/Feminist Criminology as well as to public sociological conversations about violence against immigrant women.

I am requesting support from Faculty Development Grant to research and write an article for publication in *Signs: Journal of Women in Culture and Society*, an internationally-renowned interdisciplinary peer-reviewed journal. This article will offer a socio-legal history of policies that have shaped public institutional responses to domestic violence to show the particular obstacles faced by immigrant victim-survivors whose citizenship is not secure. I will also offer two case studies that showcase alternative strategies being implemented by two different NYC-based efforts working with immigrant victims-survivors of domestic violence: Sakhi for South Asian Women, a community-based organization, and Anti-Violence Advocates Against Deportation, a citywide coalition.

This article will build from empirical research that I have already conducted. However, I will hold follow-up interviews with selected leaders in these two organizations. I am preparing my IRB application, to be submitted by April 15, 2015.

My research is directly relevant to the BMCC community, as I look at the ways that social policies shape the experience of minoritized communities living in New York City. My work lifts up the stories that are often made invisible because they are outside the dominant narrative. I am eager to find more opportunities to share my work with students, faculty, staff, and others. I am in my second year at BMCC and support through the Faculty Development Grant will help me in growing and disseminating my scholarly work. The research for this

article will be included as a chapter in my book manuscript so this grant will indirectly support the advancement of this larger project as well.

Timeline

April 2015. Submit IRB Application (by April 15, 2015 submission date); Continue research on social policies (to expand upon research already completed);

Present conference paper at the Critical Ethnic Studies Association Annual Meeting. Here, I will present my research on the case studies and expect to received helpful feedback that will shape my final draft.

May 2015. Continue research on social policies;

Present conference paper at Law and Society Annual Meeting. Here, I will present research on social policy and expect to receive constructive feedback.

June-July 2015. Continue research on social policies; Conduct follow-up interviews.

August 2015. Write/complete draft of article.

October 2015. Revise draft and prepare for submission.

November 2015. Submit article to *Signs: Journal of Women in Culture and Society*

February 2016. Present research/publication.

Budget

Summer Stipend to support research and writing \$3,000
TOTAL \$3,000

[Bibliography Omitted]

SAMPLE APPLICATION #2

Project Title: “Variations of Frida: Graciela Iturbide, Mario Bellatin, and La Chica Boom”

Abstract:

The image of Frida Kahlo’s face is everywhere: it has been reproduced in t-shirts, altars, posters, shoes, postcards, pins, and handbags. This visual saturation is the point of departure of my article. I want to explore the relationships between image, text, and referent, as it unfolds in three very recent inter-medial works that reinterpret and re-imagine the icon and legacy of Frida Kahlo. The works are a photo book (*Frida’s Bathroom* [2008], with photographs by Graciela Iturbide and a text by Mario Bellatin); a biography (*The Two Fridas* [2009] also by Bellatin), and a performance (*Su(Frida)* [2012] by Ximena Ibarra, a.k.a. La Chica Boom). Photography, literary fiction, and performance interrogate, through the specificities of each medium, the referent “Frida.”

1. Project Narrative:

Frida Kahlo’s life, her oeuvre, her house, her relationships, and even her fashion, have been widely studied and documented. Numerous exhibitions and books have explored different facets of the artist life, including her connections to surrealism, her relationship with Diego Rivera, and her photographic archive.¹ Moreover, the image of Kahlo’s face is everywhere: it has been reproduced in t-shirts, altars, posters, shoes, postcards, pins, and handbags. It is this sort of overexposure, so to speak, what is at the core of the works I analyze in my proposed article “Variations of Frida: Graciela Iturbide, Mario Bellatin, and La Chica Boom.”

In this article, I investigate the relationships between image, text, and referent, as it unfolds in three very recent inter-medial works (i.e., works combining photography and text, or images, text, music, and live performance) that reinterpret and re-imagine the icon and legacy of Frida Kahlo. These works, I argue, ask to be considered together. The first work is *El baño de Frida* [Frida’s Bathroom] (2008), which can be described as an object-book. One side of the book displays the black-and-white photographs made by Graciela Iturbide inside Kahlo’s bathroom, which remained closed for fifty years after the death of the artist; the other side of the book—i.e., if one flips the book over—presents the reader with a story by Mario Bellatin, *Demerol sin fecha de caducidad* [Demerol No Expiration Date] (2008). The second work is *The Two Fridas* (2009), also by Bellatin. In this book, the author turns to fiction and to photography to offer “his version” of the life of Kahlo. Both *Frida’s*

¹ See, for example, Hayden Herrera’s *Frida: A Biography of Frida Kahlo*; Eli Bartra’s *Frida Kahlo: mujer, ideología y arte*; *Frida Kahlo, contra el mito* by Patricia Mayayo; *Devouring Frida: The Art History and Popular Celebrity of Frida Kahlo* by Margaret A. Lindauer; *Frida Kahlo: The Camera Seduced*, a memoir by Elena Poniatowska and essay by Carla Stellweg; *The World of Frida Kahlo*, edited by Erika Billeter; *Lola Alvarez Bravo: The Frida Kahlo Photographs*, edited by Salomon Grimberg. Kahlo as a pop culture and as a fashion figure is the topic of Janis Bergman-Carton’s “Strike a Pose: The Framing of Madonna and Frida Kahlo” and of Rebecca Block and Lynda Hoffman-Jeep’s “Fashioning National Identity: Frida Kahlo in ‘Gringolandia’”. One article that examines the relationship between the visual, the textual, and self-representation in Kahlo’s paintings and writings is Levinson C. Reis’ “Paratexts to Frida Kahlo’s Oeuvre: The Relationship between the Visual and the Textual, the Self and the Other, from Self-Portraits to the Diary Entries.”

Bathroom and *The Two Fridas* interrogate the boundaries between fiction, biography, and autobiography and offer the reader/spectator different variations of Frida as an ordinary human being or as a ghost. It is worth noting that in these works, the interplay between the visual and the textual is not always harmonic or coherent; at times, the presence of an image makes the text more ambiguous, eluding certainty and asking a more critical posture from the reader/spectator. The third work is a performance by La Chica Boom, *Su(Frida)* (2012). In this performance, the artist combines visual imagery and music to problematize the notions of visibility, performance, and corporeality. My article, then, will explore how photography, literary fiction, and performance interrogate, through the specificities of each medium, the referent “Frida.”

As a scholar specializing in contemporary Latin American literature and Cultural Studies, my first approach to the figure of Frida Kahlo was through Bellatin’s fictional works. In fact, this research project derives from a revision of the last chapter of my doctoral dissertation, in which I discuss literary works by Bellatin. In that chapter, I argue that one of the most productive ways to approach Bellatin’s artistic practice is from the notion of montage (*montaje*). My use of the Spanish word, *montaje*, instead of montage, is intentional. The notion of *montaje* refers to the process of editing, selecting, and composing different pieces in order to build up a whole—as in filmic or theatrical montage. But in Spanish, the notion of *montaje* also refers to that which conceals the truth or coincides with the truth only in appearance. The confusion of autobiography, biography, reality, and fiction has been a constant throughout Bellatin’s artistic career. *Los fantasmas del masajista* (2009), *Biografía ilustrada de Mishima* (2009), or the apocryphal biography *Shiki Nagaoka: una nariz de ficción* (2001), are all hybrid works that re-elaborate the relation between (auto)biography and fiction by means of the collaborative encounter between text and photographic images. Likewise, Bellatin broadens the realm of fiction by literally taking the fiction off of the written page and disseminating it into the territory of performance, photography, theatre, and public events. The writer-performer has a whole network of accomplices who collaborate with him in these projects.

Demerol No Expiration Date plots and intermingles biography, autobiography, and fiction from beginning to end. In this tale, an audience goes to a conference at which, thanks to a peculiar apparatus provided by a professor, they can hear and see an old Frida Kahlo, who appears “as if she would have kept living after her death.” (7)² In this strange tale, Kahlo’s image appears projected on the screen of the apparatus while the artist herself reflects on her artistic career and comments on her works. One of the remarkable elements here is that all the works and projects that Kahlo comments on (*Salón de belleza*, *Damas Chinas*, or *Perros héroes*) are Bellatin’s works, not Kahlo’s. Thus, the whole tale functions as a self-reflection mediated at different levels—the space of the conference, the screen, Frida’s voice and image, and the false attribution of the works—about the artistic practice and writing of Bellatin himself.

Frida as an absent figure appears again in *The Two Fridas*. The Mexican publishing house Lumen commissioned Bellatin to write a biography addressed to young audiences about the Mexican painter. But when *Las dos Fridas* appeared in 2008, it became apparent that it

² Kahlo died in 1954. Translations of Bellatin’s texts are my own.

was not a conventional biography. The book begins with a narrator telling in first person—“Bellatin”—that “he has been commissioned to write a biography about Frida Kahlo”, and is composed by a series of photographs—most of them taken by the author himself—that are more related to Bellatin than to Kahlo. This commissioned biography deliberately exposes the problem of mediation—already articulated in *Demerol* through the exposition of multilayered representational apparatuses—and explores the limits and potentials of the biographical genre through a complex intertwining of photographs and a highly self-reflexive narration. The title, just like Kahlo’s famous self-portrait, alludes to the existence of not one but two Fridas.³ This is announced in a comic dialogue box next to Frida’s black silhouette, simultaneously suggesting the doubled and the absent. At the same time, the text is narrated in the first person by a writer who weaves different stories into his narration: the story of the process of writing Frida’s biography, the story of the writer’s trip along with his dog to find Frida; the stories of other characters that he connects to Frida; the story of the writer’s family, and, finally, a reflection on photography. The visual components of this book are, needless to say, of great importance. The connection between writing and photography—specifically, a portrait of Frida—appears delineated from the beginning of the narration: “The only thing that I asked for, after hearing the conditions of the commission, was a photograph of the woman around whom the narration would gravitate” (4), says the writer. The caption of this image says: “Photograph given by the publishing house at the moment of the commission” (4).

One of the tendencies within photography theory has been to conceptualize the photographic image in terms of silence, death, and absence (the names of André Bazin, Roland Barthes, and Susan Sontag come to mind); I agree with one critic when she argues in regard to German writer W.G. Sebald’s oeuvre, that “such an approach might play down the potentiality of photographs and albums to ‘intervene’ in texts as themes, representational frames and gaps, textual ‘clicks’ or mutable snapshots-like descriptions within a constant textual displacement towards a medial ‘other’” (Sándor 192). This contention can also be made in relation both to Bellatin’s fictions and Iturbide’s photographic work. In *Frida’s Bathroom*, the spectator/reader is constantly defied both by the ambiguous interplay of photographs and texts (in the sense that one medium displaces and intervenes the other) and, in *The Two Fridas*, by the unconventional way in which the so-called biographer treats his biographic subject. In *(Su)Frida*, the spectator tries to grasp the various forms of displacement that this subject called Frida experiences. There are different layers of signification in the reenactment of Frida as mother, women, virgin, and whore.

The kind of research I am proposing here puts into dialogue different forms of art expression—photography, literature, and performance—along with literary theory, photography studies, and (auto)biography studies. The theoretical discussion and the inter-medial approach I intend to develop will shed light into a less explored facet of Frida Kahlo, which is that of Frida as a referent, as an object of re-presentation for Mexican and Chicano photographers, writers, and performers.

³ Kahlo painted *The Two Fridas* in 1939.

At BMCC, my students have experienced the nuances of self-representation by looking at self-portraits by visual artists and photographers from the Americas and Europe, and by reading literary texts by prominent Latina/o and Spanish American writers. In my 200-level classes, I ask my students to write their own auto portraits as one of the written assignments. Both semesters (Spring 2013 and Fall 2013) my students have done a terrific job; they really connected with the writing assignment and were also capable of understand the notion that auto-representation isn't self-evident nor transparent.

I published an article about Mario Bellatin's oeuvre in 2011 and an article in which I discuss photography theory and Chilean photography in 2012; both articles were written and published in Spanish (I am attaching my published articles at the end of the package). I will write this article about photography, literature, and performance in English, and my plan is to publish it in a collective volume entitled *Mediatized Sensibilities: Technology, Literature, and Latin America*, co-edited by Matthew Bush (Lehigh University) and Tania Gentic (Georgetown University) next year. In order to complete this article, I need to travel to Mexico City to conduct archival research and to interview performers and photographers during the summer. This is why I would like to ask for \$3000 as a summer stipend. I plan to write the article during the summer of 2014 and to use part of the Faculty Development Grant to defray the costs of my travel to Mexico City during the month of July (airline ticket fare, lodging, meals, and local transportation).

2. Timeline:

I will be presenting a preliminary version of this research at the next Latin American Studies Association International Congress, which will take place in Chicago, Illinois, in May 21-24, 2014. I was invited to participate in a panel entitled *Mediatized Sensibilities: Technologies in Literature*, which has been accepted. The organizers of the panel, professors Matthew Bush (Lehigh University) and Tania Gentic (Georgetown University) also put together a book proposal entitled *Mediatized Sensibilities: Technology, Literature, and Latin America* (I am attaching the Table of Contents), and their plan is to publish this book in a prestigious University Press in 2015.

I expect to receive useful feedback from my peers and colleagues at the LASA Congress. My plan is then to work on the article manuscript during the summer. I plan to travel to Mexico City during the month of July. In Mexico, I will visit the Frida Kahlo Museum, and the Frida Kahlo archives to complete my research. I will also interview performer Pancho Lopez and my plan is to build networks with other performers working in Mexico City—Xandra Ibarra works and lives in Oakland. My plan is to have a complete version of the manuscript ready for submission at the end of the month of August.

May 2014: Presentation at LASA Congress.

June 2014: Revision of conference paper and writing of the article, first draft.

July 2014: Trip to Mexico to conduct archival research and interviews.

July and August 2014: writing of the article, complete second draft.

Fall 2014: Article submission and revisions.

Spring 2015: Publication of the article in collective volume.

3. Itemized Budget:

I plan to use the \$3000 Faculty Development Grant as a summer stipend and to help covering the costs of my travel to Mexico City during the month of July (the total trip budget is \$2150 including airline ticket fare, lodging, meals, and local transportation). I have consulted kayak.com to compare airfares prices during the month of July, and booking.com for lodging. I plan to stay 10 days in Mexico City.

Airfare to Mexico City (round trip):	\$600
Lodging:	\$900 (\$90 per night average, at a 3-star hotel in Chapultepec/Polanco area or a studio apartment in Coyoacán area)
Meals:	\$500 (\$50 per day)
Transportation in Mexico City:	\$150 (\$15 per day)

[Bibliography Omitted]

SAMPLE APPLICATION #3

Project Narrative: Gold is Not Noble Anymore: Synthesis and Reactivity of Nanostructured Gold Surfaces

Abstract

Gold is generally considered a chemically inert and non-reactive noble metal, but depending on its surface structure, gold exhibits chemical and physical properties which are completely different from the closely packed smooth surface. Gold catalysts, in the form of dispersed nanosized supported gold clusters, exhibit unusual chemical reactivity, which must be attributed to the structure and electronic properties of the gold nanoparticles. In order to study the relationship between surface structure and reactivity, we intend to synthesize nanostructured gold surfaces and investigate their chemical reactivity for the activation of carbon dioxide and other molecules relevant to energy and environment.

Project Description

Catalytic reactions are an essential part in virtually all chemical technologies and biological processes. The catalytic effect of metals is based on two factors - the electronic properties of the metal and the surface structure of the catalyst. Gold is generally considered a chemically inert and non-reactive noble metal, but depending on its surface structure, gold exhibits chemical and physical properties, which are completely different from those of the smooth closely packed surface. In catalysis, gold has received recently attention due to its high reactivity in low temperature catalytic reactions (1). This unusual reactivity must be attributed to the electronic properties and surface structure of catalysts, which usually consist of dispersed nanoparticles. In contrast, surface science studies suggest that the smooth, close packed Au(111) surface exhibits little chemical reactivity (2-4). The unusual chemical reactivity of gold nanostructures has led to interest in a multitude of areas beyond catalysis, e.g. in biomedical applications (5). A complete understanding of the underlying structure-reactivity mechanism requires the controlled, reproducible synthesis of nanoparticles or nanostructured surfaces combined with structural characterization methods at nanoscale resolution.

In the proposed project we aim to explore / develop a new method for synthesizing reproducible nanostructured gold substrates, which allow us to control the structures from the nanometer to the submicron scale.

In the *first part* of this project, we intend to apply a recently developed method to produce nano-sized surface defects by using *ion etching*, i.e. sputtering the surface with high-energy noble gas ions (argon or neon). This method permits to produce well-defined surface defects in the shape of hexagonal vacancy islands (pits) on single crystal Au(111) surfaces (see Fig. 1 below). Characterization of these surface structures on a nanoscale is performed with Scanning Probe Microscopy Techniques (SPM). Based on preliminary results described below, we expect to control the size and shape of the islands as a function of ion etching conditions - exposure time, ion energy and incident angle of the ion beam.

In the *second part*, we investigate the reactivity and stability of select nanostructures on Au(111) surfaces (high vs. low defect density), i.e. their capacity for adsorption and bond activation of molecules relevant to energy and environment (CO_2 , CO, H_2

and H_2O). The activation of carbon dioxide is of particular interest due its environmental relevance and its role in the synthesis of liquid fuels from $\text{CO}_2 + \text{H}_2\text{O}$ (6).

It is well known that none of these molecules adsorb on the smooth Au(111) surface, even at low temperature (with exception of H_2O). The present understanding is, that low coordination sites on gold, i.e. surface step and kink sites, are chemically more reactive than the highly coordinated sites of the smooth Au(111) surface (7). Since the first step in these reactions involves most likely the adsorption of the molecular reactants (Langmuir-Hinshelwood mechanism), step sites are thought to play an important role in activating these reactions. Therefore, well-characterized, stable model catalysts based on nanostructured Au(111) surfaces are expected to play an important role in understanding the mechanism of these reactions on supported gold catalysts. An equally important aspect of these reaction studies will be to determine the *structural stability* of the surface under reaction conditions (4) through characterization with Scanning Probe Microscopy Techniques - Scanning Tunneling Microscopy (STM) and Atomic Force Microscopy (AFM).

The specific questions we intend to answer are:

1. Can we **synthesize nanostructures on Au(111) surfaces with ion etching**, which allows us to control the size and structure of surface defects on a nanoscale?

2. What are **reactivity and stability of these nanostructured Au(111) surfaces** towards molecules relevant to energy and environment (CO_2 , CO , H_2 , H_2O)?

Preliminary Results

In preliminary work performed at Brookhaven National Laboratories, we have produced nanostructured Au(111) surfaces by ion beam etching of clean, well-ordered single crystal Au(111) surfaces. After characterization of the smooth Au(111) surface, the surface was subjected to short 1 keV Neon ion sputtering intervals at elevated temperatures. Images obtained with Scanning Tunneling Microscope (STM) demonstrate that this procedure results in nanosized hexagonal vacancy islands (pits), shown in Fig. 1.

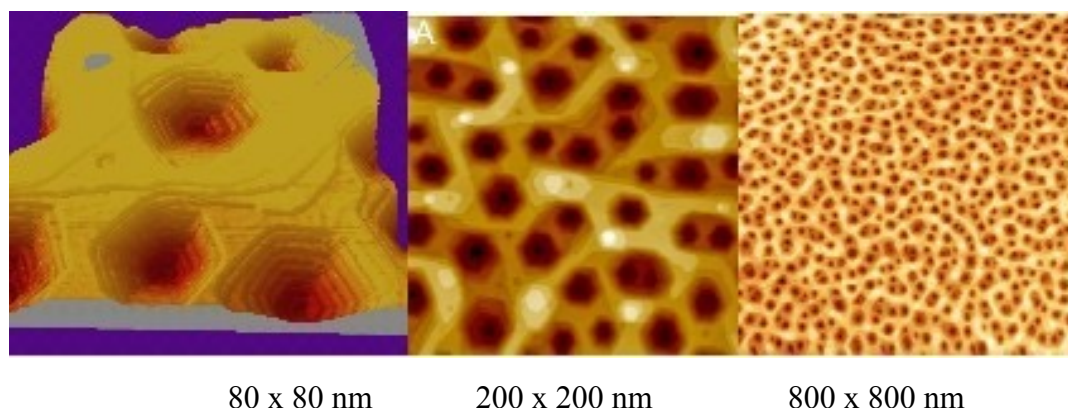


Fig. 1: STM images of the Au(111) surface after ion etching show hexagonal vacancy islands with average pit "diameters" of ~ 20 nm. The 3D-image at left shows details of the pits, which have an "inverted pyramid" structure and depths of ~ 10 atomic layers (each surface step represents an atomic layer)

Variation of the sputtering conditions, such as the number and length of the sputtering cycles, should allow us to reproducibly control the size and depth of the pits. Larger pit sizes increase both the depth of the pits (1 to 10 atomic layers) as well as the length of the monoatomic steps.

Experimental Method

Experiments will be performed in collaboration with Dr. Jan Hrbek at the Chemistry Department at Brookhaven National Laboratories (BNL) and the Center for Functional Nanomaterials (CFN) at BNL. Synthesis and characterization of the nanostructured Au(111) surfaces will be performed in a Ultra High Vacuum Chamber (UHV) equipped with a Scanning Tunnel Microscope (STM), an Ion Sputtering System and other surface probes. Chemical reaction studies will be performed in a separate UHV chamber, which contains facilities for vibrational spectroscopy with Infrared Reflection Absorption Spectroscopy (IRAS), an Ion Sputtering System and other surface spectroscopies. Additional surface characterization to determine the stability of the surfaces at ambient pressure, will be performed with an Atomic Force Microscope at CFN.

Relevance of Work / Benefits

Relevance to Surface Science and Catalysis

This work is part of a larger effort to characterize the structure-reactivity relationship of metals at the nanoscale, and will eventually aid in the development of better catalysts for the activation of carbon dioxide and other molecules relevant to the environment (greenhouse gases) and energy (sustainability).

Professional Development and Benefit to Students

This work will enable me to collaborate with outstanding scientists (Dr. Hrbek and others) and perform research with state-of-the-art equipment at Brookhaven National Laboratories. This will in the end benefit my research and teaching at BMCC. Even though the proposed work will be carried out at BNL, the experience gained there will benefit our research here at BMCC. We are currently acquiring an Atomic Force Microscope at BMCC and plan to continue research with undergraduate students after the new instrument is operational (Fall 2012). Undergraduate students will have the unique opportunity of using state-of-the-art equipment to gain "cutting edge" research experience in nanoscience.

Publication

We intend to publish the proposed research in *Journal of Physical Chemistry* or *Surface Science*.

Timeline

- July/August 2012: Experimental work at BNL (4-6 weeks).
- Fall 2012: Preparation of manuscript for publication.
- January 2013: Submission of manuscript and final report. March 2013: Presentation at the Center of Excellence in Teaching, Learning and Scholarship

Budget:

Summer Stipend: \$3000

The stipend will be used for summer research at BNL (4-6 weeks).

[Bibliography Omitted]